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Contents

NOTICES.—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Dr. Levinstein's Indictment

DR. HERBERT LEVINSTEIN has at length broken through the reserve he has rather rigidly imposed on himself for some time and frankly disclosed his mind on the present position of the British dyestuffs industry, and more particularly the policy and prospects of the British Dyestuffs Corporation. His address to the Society of Dyers and Colourists at Bradford on Thursday will be recognised throughout the industry as much too remarkable and outspoken an utterance to be ignored. It is obviously not a hastily conceived statement; on the contrary, its matter and its expression both suggest deliberation. Though his indictment of the policy of the Corporation, in which he is understood to be the largest individual shareholder, is severe, it is expressed in carefully measured terms, and though some personal considerations are involved a serious effort has clearly been made to treat them in an impersonal spirit. No one can be any longer in doubt as to what Dr. Levinstein thinks and feels on this subject.

The careful historical survey of the British dyestuffs industry with which the address opens shows this country in a more than usual favourable light. Dr. Levinstein firmly disputes the theory of Dr. Duisberg that the Germans, with their superior knowledge and love of chemistry, their greater idealism and devotion to abstract thought, took the "small English seed" dropped by Perkin in 1856 and made out of it "the precious German garden." On the contrary, he takes pains to show that the people who founded the great German dyeworks learned their business in England, and that the important early patents were taken out by Englishmen, by Frenchmen, and by German chemists working in English factories. It is not yet, however, quite clear how with these advantages the industry gradually drifted into German hands. Inadequate protection of patents from being exploited by Germany is the principal reason assigned, and there was also the heavy British duty on alcohol; but, even so, the success of the Germans in exploiting our patents, in attracting their own chemists back, and in building up their great research, manufacturing, and sales organisations points to something that was lacking in the British industry in those days.

These considerations, however, are largely historical. The vital point of Dr. Levinstein's address lies in what follows. His claim is that if, in the fifteen years preceding the war, the Dyestuffs Act had been in being, the British companies carrying on business here in 1914 would have been extremely powerful institutions, but that the companies now amalgamated in the British Dyestuffs Corporation are weaker than before the war, less dangerous competitors, and a source of great anxiety to all concerned. This situation, he suggests, is the explanation of the recent efforts to execute an agreement with the German I.G., an agreement to which strong opposition has admittedly been offered. The circumstances under which the amalgamation took place of Levinstein, Ltd. and British Dyes, Ltd. and what Dr. Levinstein says about the finance of the transaction are largely domestic matters for the shareholders, and the shareholders are really the competent persons to discuss them.

What concerns the public is the future of the dyestuffs industry, with which the future of the Corporation is largely bound up. Dr. Levinstein leaves us in no doubt as to his opinion—he thinks the Corporation is going the wrong way. Assuming for the moment that this is so, what precisely are the changes of policy required to secure the success which everyone desires? What exactly are the old lines of policy to be abandoned and the new lines to be substituted? Where are the points at which the switch-over is to be effected? Dr. Levinstein, for the time being, does not go into these matters in great detail. He is clear, however, on one point—that "the policy of the Board and the constitution of the Board" having been disapproved, the present directors should tender their resignations. That, of course, is not in itself a solution of the real trouble; it is only a possible way to a solution. It might make matters better or make them worse or leave them much as they are—no one can say in advance of actual experiment. The practical fact is that only the shareholders themselves can decide these things. If they disapprove of the present policy of the directors, they can remove them and appoint others.

If they approve the policy, presumably they would desire the directors to remain. Many will understand and sympathise with Dr. Levinstein's position, but outsiders do not exercise control. Whatever action is needed the shareholders themselves must take it, and it is they who must first be convinced.

Laboratory and Workshop

Mr. Woolcock, as President of the Society of Chemical Industry, began his visitation of the sections in Manchester last week, taking as his first subject the relation of science, mainly chemical science, to industry. The theme was already a well-worn one, but Mr. Woolcock contrived to add a few new and stimulating touches. That there should be the closest possible co-operation between the scientist and the industrialist is now almost a platitude. It was an operative belief during the war, but the sense of its importance seems inclined to relax, and that is just the time to insist afresh on it. It would be entertaining, we fancy, to know precisely who and what the President had in mind when he spoke of the real scientist who fancies himself as a politician or perhaps, a performer on the euphonium, as well as of the real industrialist who prides himself on his gifts for research. His observations were at any rate very true to life—everyone, of course, has a weakness for doing the other man's job, too often at the expense of leaving his own undone. Equally true were Mr. Woolcock's reflections on the mistake of the young university man coming down fresh from the mount to direct the courses of industry, but also on the real value such men are in industry when they are prepared to go through the mill. Much was said about the present need of co-operation among chemical organisations, and if Mr. Woolcock can introduce something of the spirit of the A.B.C.M. among our various nonconforming societies their collective value may be considerably enhanced.

A Concession to Merchants

A concession of material value to chemical merchants has been secured from the Treasury by the British Chemical and Dyestuff Traders' Association in the matter of the bonding of goods liable to key industry duty. After about twelve months' negotiation, the Treasury has accepted the case put forward by the Association, and has announced its intention to allow the bonding of such goods. The chief advantages of the scheme to the merchant are (1) that stocks in bond will become, as soon as the necessary order has been issued, immediately available for re-export and the troublesome process of obtaining "drawbacks" will become unnecessary, and (2) that bulk supplies can be imported and put into bond and the importer will not be called upon to pay duty until the goods are required and taken out of bond. The regulations for the bonding of goods are now under consideration, and it is understood that the Treasury's decision will become operative at an early date. The result is an excellent example of the value of collective action.

Under the existing procedure, importers of chemical or other products scheduled under Part I of the Safeguarding of Industries Act have to pay the duty of $33\frac{1}{3}$ per cent. at the time the goods are landed and cleared at the Customs. Prior to the passing of the Act, importers were accustomed to hold considerable supplies of goods from which they were able to meet home and overseas demands without delay, and much of the stuff imported—the Association estimate the proportion at quite one half—was re-exported. In the case of re-exports, at present the importer has to obtain a "drawback" of the amount of duty paid, if he is to stand any chance against competition, and the difficulty and uncertainty of obtaining this is naturally hampering the merchant's re-export trade. It is to this cause that the chemical merchants attribute the decline in the volume of re-exports. Some firms, it is stated, have tried to avoid the difficulty by holding their stocks at Continental ports, but this means considerable inconvenience as well as, incidentally, the loss of shipping business to and from British ports. The present system, too, involves the tying up of a large proportion of the merchant's capital. On a cargo, for example, of the value of £3,000, he would have to pay £1,000 down as duty and would not, of course, be able to recover it until all the consignment had been disposed of. Chemical merchants in this matter have had a grievance with substance in it. They have put their case intelligibly before the Treasury, and it is satisfactory to find that the Treasury have met their wishes.

Those Annual Subscriptions

Dr. Travers, in a letter we are glad to publish on another page, draws attention pointedly to the heavy demands made on chemists of limited means by the amount required to admit them to membership, not of all the chemical societies, but merely of the big four or five. By the time a chemist has subscribed to the Institute of Chemistry, the Chemical Society, the Society of Chemical Industry, the Institution of Chemical Engineers, the Club, and one or two other bodies, he will have very little change out of £20. Yet Dr. Travers reminds us that between them these societies do not possess a library which is in any way comparable to the Patent Office Library, or a lecture hall which will accommodate even a moderately well-attended meeting, while, in addition, no set of abstracts comparable with the *Chemical Abstracts* of the American Chemical Society is published here. There is far more loyalty to the societies, as it seems to us, in this unemotional recognition of the facts than in a complacent belief, far too common, that nothing could be much better than it is. That eternal want of pence which troubles the individual chemist is not unknown to the societies, and whenever they propose to take round the hat, Dr. Travers suggests two rules. "If you want to raise money you must show that you are spending what you have got economically." Truly a most excellent maxim which we trust will not set too many ears burning. And next—"You must also show that you know what you want, and what you are going to do with the money when you get it." Between them, these precepts constitute two very practical tests by which no public body ought to resent being judged.

Analysis of Rare Metals

BULLETIN 212 on "Analytical methods for certain metals," recently issued by the U.S.A. Bureau of Mines, deals with a wide range of rare metals, including cerium, thorium, molybdenum, tungsten, radium, uranium, vanadium, titanium, and zirconium. The rare metals are becoming increasingly important in industry. Rare metal alloys have properties which indicate that we are only on the threshold of the possibilities of their utilisation in making not only non-ferrous alloys but also special steels. Not only are their uses broadening rapidly, but the metals are affecting our industries in other ways. The oxides and some salts are used as pigments; others have a medicinal value. The pure metals are made into filaments for incandescent lamps, and targets for X-ray tubes. By their efficient use in alloys, the weight of automobiles is reduced, and the wear and tear on tyres and roads is thus minimised. In machine shops they give greater efficiency to tools and reduce costs.

There has in the past been considerable uncertainty regarding analytical methods for the rare metals. A great deal has been published on the subject but the weak and the strong points of the various methods have not been investigated as thoroughly as might be desired. The Bureau of Mines at its Rare Metals station in Colorado necessarily had to do a great deal of analytical work in connection with the metals covered by this bulletin, which aims at giving the results of the experience so acquired. No claim for much originality is made, although some published methods given have been modified, and some new ones have been developed by members of the staff. The Bulletin represents a piece of useful practical work.

A Chemical Engineering Programme

THE Chemical Engineering Group, who have been singularly successful from the outset in their organisation of conferences, may be congratulated on the excellent programme they have arranged for the 1924-25 session. At the opening meeting on Thursday, October 23, at the Engineers' Club, two papers will be presented—one on "Crystallisation," by Mr. Hugh Griffith, and the other on "The development and formation of crystals," by Professor T. V. Barker, Oxford. Mr. C. S. Garland, chairman of the group, will preside, and an informal dinner will be held between the reading of the papers and the discussion on them. "Chemical works costs" is the subject for the second meeting on November 13, and it will be introduced with papers by Mr. F. M. Potter and Mr. H. C. Marris (Bolton). On this occasion the chair will be taken by Mr. W. J. U. Woolcock, president of the Society of Chemical Industry. The first meeting in the new year on January 16, probably to be held in London, will be occupied with various papers on "Low temperature carbonisation," and for the second, in February, the interesting subject of "Mechanical *v.* Hand burners for sulphur-containing materials" has been chosen. On March 3 another joint meeting with the Hull Chemical and Engineering Society will be held at Hull, at which Professor W. M. Cramp of Birmingham University will present a paper on "The pneumatic transport of materials."

Points from Our News Pages

A full report is published of a remarkably outspoken address by Dr. Levinstein on the British dyestuffs situation (p. 364).

Three recently published chemical works are noticed by our reviewers (p. 367).

An Indian correspondent describes research work on Indian timbers and their chemical treatment for industrial purposes (p. 368).

A summary is published of the annual report of the Department of Scientific and Industrial Research (p. 369).

Mr. Woolcock in his first presidential address to the Manchester Section of the Society of Chemical Industry deals with the relations of science and industry (p. 370).

Dr. M. W. Travers raises the question of the annual subscriptions paid by members of various chemical societies (p. 376).

The London Market reveals a satisfactory expansion in business and an improvement in export inquiries (p. 382).

Our Scottish market report shows no important change; business in heavy chemicals continues quiet (p. 385).

Books Received

THE EXTRA PHARMACOPŒIA. Vol. I. By W. H. Martindale and W. W. Westcott. London: H. K. Lewis and Co., Ltd. Pp. 1163. 27s. 6d.

THE CORROSION OF METALS. By Ulick R. Evans. London: Edward Arnold and Co. Pp. 212. 14s.

OUTLINES OF ORGANIC CHEMISTRY. By E. J. Holmyard. London: Edward Arnold and Co. Pp. 466. 7s. 6d.

JOURNAL OF THE INSTITUTION OF PETROLEUM TECHNOLOGISTS. September, 1924. London: The Institution. Pp. 220. 7s. 6d.

The Calendar

Oct.		
11	North of England Institute of Mining and Mechanical Engineers: General Meeting. 2 p.m.	Lecture Theatre of the Institute, Newcastle-upon-Tyne
11	Mining Institute of Scotland: General Meeting. 3 p.m.	Heriot Watt College, Chambers Street, Edinburgh
11	Society of Chemical Industry (Nottingham Section): Annual Dinner. 7 p.m.	Flying Horse Hotel, Poultry, Nottingham
15	Society of Glass Technology: "The Present Position of the Glass Industry in North America." Professor W. E. S. Turner. 3 p.m.	The University, St. George's Square,
15	Institute of Chemistry (London Section): "The Position of Chemistry," by members of the Institute from Abroad.	30, Russell Square, London, W.C.1.
16	Institution of the Rubber Industry (Manchester Section): "Some Problems in the Rubber Industry." Herbert Standring.	Textile Institute, St, Mary's Parsonage, Manchester.
16	Chemical Society. Ordinary Scientific Meeting. 8 p.m.	Burlington House, Piccadilly, London.
17	Society of Dyers and Colourists (Manchester Section): "The Action of Caustic Soda on Cotton." J. Huebner and E. Wootton. 7 p.m.	36, George Street, Manchester.
17	University of London: "Water Supply and Its Purification"—Lecture II, Professor S. L. Rashkovitch. 5.30 p.m.	University College, Gower Street, London, W.C.1.
20	Ludwig Mond Lecture: "Life and Work of Dr. Ludwig Mond." Professor H. B. Dixon.	Chemistry Theatre, Manchester University.
20	Birmingham Rotary Club: "Producers *versus* Consumers." Sir Ernest J. P. Benn. 1 p.m.	Queen's Hotel, Birmingham.
21	Hull Chemical and Engineering Society: "The Thermal Efficiency of Internal Combustion Engines." Mr. G. E. Scholes.	Hull Photographic Society's Rooms, Grey Street, Park Street, Hull.
22	Faraday Society, Geological Society, and the Mineralogical Society: General Discussion on "The Physical Chemistry of Igneous Rock Formation." 3 p.m.	Burlington House Piccadilly, London.

Review and Criticism of British Dyestuff Industry

Remarkable Indictment by Dr. Levinstein

The address which Dr. Herbert Levinstein delivered before a meeting of the Society of Dyers and Colourists at Bradford, on Thursday, proved to be one of the most important utterances on the dyestuffs question. For the first time Dr. Levinstein made a full disclosure of his own views on the situation, and offered a frank criticism of the position of the British Dyestuffs Corporation. We give below, in view of its character, virtually a full report of the address.

DURING each of the last three years, Dr. Levinstein explained, he had addressed the Society on the British dyestuff industry, but it was impossible to discuss the British dyestuff industry without alluding, however briefly, to the British Dyestuffs Corporation. It was difficult enough to direct the fortunes of a great dyestuff concern, even for those who had made a study of the problems. For those in office, without experience, however able, willing, and industrious they might be, the task appeared to him almost impossible. It would have been very distasteful to say one word which might conceivably have had the effect of adding a difficulty, something which might have been construed into a criticism of those in the middle of a task. The position now was in itself so critical that he could not conceive that any remarks of his would add to the embarrassment of the chairman, the Government directors, or their colleagues on the Board of the British Dyestuffs Corporation, and he felt that having kept silent for three years this silence might be misconstrued, if maintained longer.

Early History of British Industry

It was often thought, he proceeded, that when Perkin discovered Mauvein, the first aniline dye, and proceeded to manufacture it, the British contribution to this industry ceased. The Germans, it was said, with their superior knowledge and love of chemistry, their greater idealism and devotion to abstract thought, took this "small English seed" and made out of it "the precious German garden"—he was quoting from a speech by Dr. Duisberg at the Perkin Jubilee Dinner in 1906. This was far from the correct view. The two outstanding personalities in the dyestuff industry in the first 15 years after the discovery of Mauvein were Englishmen, Perkin and Nicholson. The famous Caro, afterwards of the B.A.S.F., whose great period came later, and Martius, afterwards one of the leading figures in the A.G.F.A., were both in Manchester at Roberts, Dale and Co. Peter Griess was in England, and also Leonhardt—afterwards with Cassella—subsequently the founder of the Farbwerk Muelheim.

That distinguished personality, Otto Witt, was at Williams, Thomas and Dower. Witt was the author of that classical report on the German Chemical Exhibit in Paris in 1900. This could now be matched with our own publication, "Chemistry in the Twentieth Century," edited by Dr. E. F. Armstrong, a permanent, fascinating and encouraging record of the British chemical science exhibit at Wembley. In a similar way the British Colour index had replaced the old Schultz and Julius. Meister, one of the founders of Meister, Lucius, and Brüning, was in business in Manchester. We had, too, not only the factories named and Perkin's colour works, but also those of Simpson, Maule and Nicholson—for fourteen years the largest coal tar works in the world—under the brilliant direction of Nicholson. That great chemist and great man Hoffman was their adviser. Before 1865, Read Holliday and Sons, L. J. Levinstein and Sons, and Dan Dawsons were in existence, and there was no difficulty in getting good chemists adequate in number for the requirements of the industry at that time.

England the Real Home of the Industry

The point he wished to make was that the people who subsequently founded and developed the big German dyeworks learned their business in England. They found that a lot of money could be made in the dyestuff industry when a knowledge of chemistry was combined with energetic salesmanship. But they also realised that energetic salesmanship was not alone sufficient. They had seen how Perkin had to devise new technical applications before his new chemical invention could be marketed. Hence they developed the technical sales organisation, which was such a very important department of the trained colourist. It was in England, too, that the Germans learned how to manufacture complicated chemicals on a large scale.

It was, then, on experience gained in this country that there was built up that great German industry which in 1913 had magnificent sales and strong research organisations, wonderful factories, and very good experimental dye houses. But the principles which distinguished the aniline dye industry, an industry unique because dependent for success on inventions, were not introduced by the Germans.

It was worth while to consider these points in a little detail. Perkin himself told them that he had to discover not only Mauvein, but also the tannic acid method of fixing basic dyes before he could sell Mauvein for colouring cotton. There was no method known for fixing basic dyes on cotton. The dyeing instructions, the working out of new dyeing and printing methods, were part and parcel of the industry in England from the very commencement, and were not introduced to the industry by the Germans. Nor did the Germans introduce the methods of systematic research with which their name was so frequently associated.

It was very instructive to glance for a moment at the earlier patents:—The year 1856 gave Perkin's Mauvein. In 1859 there were patents for Violets from Greville Williams, R. D. Kay, Beale and Kirkham, and Price. Further, in this year, we had the Magenta patent of Renard Frères and Franc, and also Gerber and Keller. In 1860 came Medlock's famous Magenta patent, first used by Simpson, Maule and Nicholson, and further patents for Violets by J. Dale, Caro, Richard Smith, and Coleman. In the same year Gerard and De Laire transferred to Simpson, Maule and Nicholson patents for obtaining an improved Violet. In 1861 came Laurent and Casthelaz with their nitro-benzol Magenta process.

The following year, 1862, was a most productive year to which Perkin contributed what was then considered a new class of Violets. Simpson, Maule and Nicholson brought out Phosphine which they did not patent, Roberts Dale produced Manchester Yellow, and above all, Simpson, Maule and Nicholson discovered the Aniline Blues, Gilbee Soluble Blue, and Nicholson Alkali Blue. In 1863 came Hoffman's Violet, the patent of which was transferred to Simpson, Maule and Nicholson, and in 1866 Bismarck Brown—or Manchester Brown—was put on the market by Roberts Dale, the patent being dated 1863. Methyl Violet, discovered by Lauth in 1861, was brought on the market by Poirrier and Chappat in 1866. This firm oxidised di-methyl-aniline and patented the production of the Violet so obtained.

This was a wonderful record of work, and they would observe that whenever the names of Germans occurred they were always Germans who were in the employment of British firms. The important patents were taken out by Englishmen, by Frenchmen, and by German chemists working in English factories. These inventions, the result of systematic research, developed the industry far beyond Perkin's original discovery. They also showed the German companies in the most practical way possible the money that could be made out of judicious research—in this case largely other people's research. In fact, in those early days the German companies infringed these patents to the despair of the inventors.

Effects of Inadequate Patent Protection

Until 1876 there was no adequate patent protection in Germany, consequently German dyestuff factories could exploit the discoveries made by English and French dyestuff chemists. Hoping to protect himself Nicholson refused to patent his discovery of Alkali Blue (1862), far and away the most beautiful blue then known. This availed him nothing. According to Ivan Levinstein (Presidential Address to the Society of Chemical Industry in 1902) the Germans made a profit of half a million pounds out of Nicholson's invention. The advantage of being able to use the research work of other nations without paying a toll was not without example at a later date. The orientation of the dye industry in Switzerland was due to the absence of patent protection in that country until a much later date.

The discovery of synthetic alizarine in 1869, almost simultaneously by Graebe, Liebermann, and Caro in Germany and

Sir W. H. Perkin in England, was another instance of the depressing results of inadequate patent protection. Both processes were patented in England. Neither could be patented in Germany. Graebe and Liebermann's English patent was acquired by the Badische. The latter exchanged licenses with Perkin, who thus acquired by arrangement the monopoly in this country for the manufacture of alizarine, but in Germany there were other makers beside the Badische. There was no monopoly. Anybody could make alizarine, who wished to do so. The Franco-Prussian War of 1870–1 followed closely on the discovery of alizarine, and for two years the German development was impeded. In the course of this war great profits were made by the British dyestuffs companies.

What happened afterwards was of great interest to-day. In 1869 Perkin had already sold one ton of alizarine; in 1870 this was increased to 40 tons and in 1871 to 150 tons. The Germans, owing to their war, could only start in 1871, but even in that year they sold 220 tons. In 1873 they sold 2½ times as much alizarine as Perkin. In the following year Perkin retired from the contest and sold his business to Brook, Simpson, and Spiller. Nicholson had already gone. The two great figures disappeared from the English works. There was little wonder in this. To find themselves outdone by the Germans in marketing their own inventions, to find the Germans selling many times the quantities of the dyes they had themselves discovered, was a most discouraging state of affairs.

The Beginning of German Supremacy

The Franco-Prussian war over, and with the builders of the British dyestuff industry removed the future of the German industry was easier. The alizarine trade passed almost entirely into German hands. In 1881 they made the Alizarine Convention and cleared in that year a million pounds profit. They wrote off the cost of their old works, constructed new ones with excellent laboratories, and staffed them with good research chemists. The Germans understood, as apparently some never would understand, that only great sales could justify great research organisations. It was equally true that only great sales organisations could attract the best research chemists. The reason was not far to seek. The inventor in a dyestuff factory always drew a royalty on the turnover or profits of the dye he had discovered. His income depended, therefore, on the efficiency of the sales department of the firm for which he was working. The examples given of Nicholson's Alkali Blue, and of the synthesis of alizarine, would convince them that they who lived in those days had reason to attribute the decline of the industry to the absence of patent protection in Germany. That subsequently our English patent laws acted detrimentally to the British industry was generally admitted.

In the manufacture of many dyes the Germans had another great advantage. They had no heavy duty on spirit as in England. In 1902 (Silberrad, *J.S.C.I.*, 1902) the cost in England of di-ethyl-aniline from duty free alcohol would have been 5½d. per pound. The actual cost of this product from duty paid alcohol was 2s. 5½d. Thus it was more profitable to manufacture dyestuffs in Germany than in Great Britain. Purely commercial, very human, and natural reasons took the few men of great talent such as Caro, Witt, and others, back to their native country, where they could earn greater salaries and get larger tantiemes as a result of the far greater German sales.

If Perkin had had Present Day Advantages

It was interesting to speculate what might have happened if Perkin and Nicholson had been interested enough to stay and fight out the commercial war that ensued. Perhaps the history of the dyestuff industry might have been different? Who could say? Leadership counted for much in the industry. But one thing was clear. If, after the Franco-Prussian war, *laisser faire* had not been the policy of the State, a very different position would have resulted in the country. If the State had provided duty free spirit on terms comparable to those enjoyed abroad, protection for inventions, prohibition of import of dyes manufactured abroad, information concerning foreign products, and above all, an assurance of a benevolent interest in the industry, did they think that Perkin and Nicholson would have left?

Yet these were precisely the measures which the State took after the Great War. If Perkin and Nicholson had remained or if any of the other able men in the industry had had these advantages what policy would they had adopted? Would the policy have been to use these facilities for the purpose of securing in the limited home market the highest possible prices to the neglect of the great markets of the world? He did not for one moment believe it. He stated with complete confidence that if in the fifteen years preceding the war, during which he was associated with the British dyestuff industry, the Dyestuff Act had been in being the British companies carrying on business here in 1914 would have been extremely powerful institutions. They never obtained—nor could obtain—one fraction more than the world's prices for their commodities. They always accepted competition prices where they did business. Had they had, as the British industry has to-day, the first refusal for all orders in the home market, they would have been immensely strengthened in competing with the Germans abroad. Their costs would have been lower on account of the greatly increased turnover.

B.D.C. Policy

To-day the companies now amalgamated in the British Dyestuffs Corporation were weaker than before the war, less dangerous competitors, and a source of great anxiety to all concerned with this great industry. For this reason, no doubt, the Board of the British Dyestuffs Corporation had proposed an agreement with the I.G. Last April at the annual meeting the chairman stated that the Board would resign if they were not encouraged to complete the agreement, as outlined. The colour consumers, the customers of the company, through the chairman of their association, had definitely stated that they disapproved of the agreement, that they would prevent it if they could, and would welcome an entire reorganisation of the management., Further, the agreement, the headings of which had become known, was opposed by every one of the organised bodies in Great Britain representing pure and applied chemistry, including the Association of British Chemical Manufacturers.

Thus it appeared that the policy of the Board and the constitution of the Board was disapproved by the whole of the chemical world and by their customers, the colour-using interests. Out of much that was obscure, this much was certain. The agreement had not been approved. The situation contemplated by the chairman and his colleagues had arisen. The Board had not been encouraged to complete the arrangements with the I.G. in which they put their faith, and they would no doubt tender their resignations.

Both the Board and the agreement, however, were supported at the annual meeting in April of this year by several speakers, men of high standing in the city of London, who represented substantial financial interests in the company. The public flotation of the British Dyestuffs Corporation, in 1919, was not a success. A large proportion of the shares remained, and apparently still remained, with the underwriters. He viewed with concern this divergence of views between colour users and those representing the underwriters.

They all wanted a British dyestuff industry and this must include the British Dyestuffs Corporation, with factories employed in making good dyes, selling them at reasonable prices, and earning a reasonable return on the capital invested; a company able to supply the home market with satisfaction to its customers, and strong enough to battle for a share in the world's markets. Such a company would satisfy all classes of shareholders and satisfy the purpose for which Parliament enacted the Dyestuff Act. But they could only get such a company with the active assistance and support of the colour users. In the circumstances an impartial dispassionate comment on the divergent views could only be helpful, and might be of interest to them.

Dr. Levinstein and the Colour Users

I am (Dr. Levinstein proceeded) a strong supporter of the British dyestuffs industry and of the British Dyestuffs Corporation, of which I am, I think, the largest individual shareholder. I regard the success of both as vital to the security of British trade in peace and in war. The argument of what may be called the underwriters is that colour consumers are grasping and desire to buy dyes below the economic cost of production. Thereby the shareholders are deprived of their natural right to dividends, a matter of more consequence to non-consuming shareholders than to the customer shareholders. After all, the shareholders who are consumers

derive the benefit of low priced dyes, and can look with more equanimity at the absence of dividends than those whose interest in the company is purely financial.

Frankly, I do not think that this can be upheld. I have more sympathy with the consumer's standpoint. Bearing the burden of the Dyestuff Act, they consider that every effort should be made by the most competent persons obtainable to meet the demands of their trade. They are aware of the diminished production of the British Dyestuffs Corporation, their diminished and diminishing share of the British market. They may, with justice, attribute high prices to high overhead charges consequent upon idle plants.

The Dyestuffs Act in their view—and they are supporters of the Dyestuff Act, and are prepared to carry it out fairly—cannot be used legitimately to bolster up high prices for dyes; the Act should and can be used very differently, to the great advantage of both consumers and the dye manufacturers alike.

Here, at any rate, lies an apparent, though not a real, diversity of interests. Let us leave open for the moment, the question whether sometimes the demand for a reduction in the prices of British dyes has been a little hard, or on the other hand the prices charged have been on occasions unreasonably high; we can more profitably direct attention to another point, a point on which there is no diversity of interests. A shareholder in any business need not be unduly alarmed at the temporary absence of dividends, provided that the value of his shares is substantially conserved. If in addition to the absence of dividends the shareholder is faced with a diminishing asset, he is in a dangerous position.

The Amalgamation of 1919

An examination of this point in this specific case leads us at once to consider the situation created by the amalgamation of British Dyes, Ltd. and Levinstein, Ltd. in 1919. In the course of this examination I may be critical. There is a time for criticism, for instructed criticism. To withhold criticism to-day may be as unwise as it may be fatal to resist criticism.

This fusion was brought about by Lord Ashfield, then President of the Board of Trade, now a Government director of the British Dyestuffs Corporation. In 1918 you had in my firm a dyestuff manufacturing company employing 3,000 hands, analogous to, but smaller than, the large German factories. The analogy lay in these three points :—(1) The business was managed by those who had created or had grown up in it. (2) It was a company with three large factories, large assets, but with a small nominal capital. (3) It had a contented and permanent, not a nomadic, staff and a harmonious Board.

I was urged by the President of the Board of Trade in the critical stage of the war, not as a matter of business, but as a matter of patriotism, to amalgamate our business with British Dyes, Ltd. Why? Our business was not for sale. By fusing this business with British Dyes, Ltd., it was hoped so rapidly to increase production that at the Peace Conference we could be independent. We should not be exposed to the possibility of a German threat that would embarrass our negotiations, a possible threat of the Germans to withhold a supply of dyes not obtainable elsewhere and vital to our textile trade. That was the argument. In fact the amalgamation actually led to a considerable increase of production. The Germans never were able to use the dyes question as a diplomatic weapon.

I was not willing to sell. We could—if this is of interest to you—have sold it on two occasions for very large sums. In a measure it was a national, not a personal possession. I could not regard a great dyestuff business, protected by Parliament, of vital importance in peace and war, merely as a personal possession to be used as our personal feelings dictated. We never did sell our business, but we consented to put what we considered to be our duty before our inclination or our profit, and we exchanged our holding in Levinstein, Ltd. for, in round figures, some £800,000 shares in the British Dyestuffs Corporation. These shares are now worth less than a quarter of their nominal value.

Some Striking Figures

Now consider the following figures: The British Dyestuffs Corporation have recently recovered about £1,000,000 in E.P.D. from profits earned by Levinstein, Ltd. before the amalgamation. Further, they are entitled to receive, or have already received, from the Du Pont Company the sum of £250,000 in cash, on account of the American rights for the Levinstein processes acquired by the Du Pont Company. The British Dyestuffs Corporation thus obtained their factories, outstandings, stocks, processes, royalties due and goodwill for a little over three quarter million in shares, and they have regained therefrom about £1,250,000 in cash, and the present market value of what is left is about £180,000.

I would commend to your consideration the answer to this question. If this particular dyestuff business has in the last two or three years furnished about £1,250,000 of hard cash into the coffers of the British Dyestuffs Corporation out of past profits and in royalties for their processes, why is the market value of their property to-day only £180,000, a tiny fraction of the cost of the factories, large, modern, up-to-date, and complete. The great factories and laboratories carefully designed in all ways are there intact. I will venture on the answer. Simply because the value depends on the earning capacity. The value of a great chemical business depends little on the intrinsic value of the plant and machinery, even though it covers 50 to 60 acres, but on the earning capacity. This dyestuff works has lost the earning capacity it formerly possessed when in private ownership. While these factories are stagnant, in spite of the protection of the Dyestuffs Act, their trade is passing to other hands, those of people who know the aniline dye industry. Others in this country are busy working and enlarging their plant to take over a part of the business formerly held by Levinstein, Ltd.

Is it a Diminishing Asset?

There appears, therefore, to me to be no doubt that you have an asset which has diminished to a startling extent. You must remember that in addition to the factories at Blackley and the Claus plant at Clayton, this figure of £180,000 also includes the value of the indigo works at Ellesmere Port. This plant was designed, erected, and owned prior to the war by the Germans. It has now double the pre-war capacity, possesses the complete monopoly for the manufacture of indigo in this country, and is amply large enough to supply the whole British demand.

If this picture does not fit in with the complacent words of the chairman at the annual meeting of the British Dyestuffs Corporation it is not my fault. It appears to harmonise with and to explain the anxiety of the Government directors and the Board to get through an agreement—I might almost say any agreement—with the Germans. It tends to justify the severity of the terms demanded by the Germans. We may surmise that it influenced the decision of the Board to retire if they are not encouraged to complete the German agreement.

On the whole, giving due weight to the disadvantages of such a course, these figures do suggest to me that no body of shareholders have cause seriously to resist the declared intention of the directors. That is a point of view I would respectfully urge on all interested in this great question. In saying this I am sure nobody would desire to be discourteous or to fail to recognise the great trouble which the directors have devoted to an undertaking which all of them must have found a burden presenting problems entirely foreign to their previous experience. The times are too serious and too difficult for those who care about this industry or have large interests in it to be content with what has occurred.

I would recall to you the wise and, as it appears, prophetic words of Sir A. Mond when speaking in the House of Commons on February 2, 1915:

> "I speak with a certain amount of experience when I say that it is not sufficient merely to have people who, however able they may be on the commercial side, are entirely ignorant of technical matters to control a chemical business. Unless you have people on your Board who are themselves capable of appreciating every important invention and discovery in chemical engineering which your chemical engineering staff brings to you, you are very likely to get into the position into which many companies get when the so-called practical men discard all new ideas as being only fads or as being too expensive. If you want to compete with Germany in this industry you must not follow that policy."

I hope that I have not wearied you with this account and with these figures. They are of interest, because the success

of the British industry is so important to this Society and because the successful administration of the Dyestuffs Act is only possible with a successful British dyestuffs industry. The extraordinary analogy between the position of the dyestuff industry after the present war and after the Franco-Prussian war has no doubt occurred to many of you. If the ability to develop this industry were here from 1856 to 1870, why not now, when our chemical schools have so marvellously grown? Yet we are told to-day that this country is inherently incapable of competing in this industry which was created and developed here.

Let me close this address by quoting Lord Moulton's words when delivering an address on "The Manufacture of Aniline Dyes in England" in the Manchester Town Hall on December 8, 1914: "Let me deal for a moment with the difficulties that face one. The first is that there is a lack of the necessary technical skill. I have a great difficulty in returning a polite answer to that. To my mind it is nonsensical." That, too, expresses my mind precisely.

Reviews

THE SYNTHESIS OF NITROGEN RING COMPOUNDS CONTAINING A SINGLE HETERO-ATOM (NITROGEN). By CECIL HOLLINS, B.Sc., A.I.C., with an introduction by Professor J. B. Cohen, F.R.S. London: Ernest Benn, Ltd. Pp. 423. 55s.

An important contribution to the scientific literature of this country has been made by the publication of Mr. Hollins' book, which is certain to find an immediate welcome both in academic and industrial circles. In no section of organic chemistry is there more need of a specialised treatise than in that dealing with the synthesis of the heterocyclic nitrogen compounds, including, as they do, groups of such outstanding interest and technical importance. The author's wise decision to limit the present volume to rings containing one nitrogen atom has enabled him to give a complete and reasoned survey of the innumerable methods of synthesis of these compounds.

It is beyond the scope of this review to treat in any manner of detail the unique presentation of the subject matter, but it may be stated that, despite the encyclopædic character of the book, it in no way degenerates into a mere collection of abstracts. The subject is handled throughout in a masterly fashion, and Mr. Hollins has produced a volume rich in stimulating ideas to all who are interested in this aspect of chemistry. The book is divided into twelve chapters which include the pyrroles, indoles and indigos, carbazoles, pyridines, quinolines, *iso*quinolines and acridines. In each chapter an introductory portion outlines the scope of the reactions involved in the succeeding sections and gives an indication of the most likely method applicable for the synthesis of any special type of derivative. The advantage of this becomes obvious when it is mentioned that in the chapter on pyrroles, for example, thirty-two sections are included, each of which is treated in a most comprehensive manner, emphasised by the inclusion of unsuccessful as well as successful results in any one direction. The value of a book of this type must depend largely upon its bibliograph, and the importance of this has been fully realised by the author, who has attempted to make it an absolute summary of work in this field of chemistry. Complete references, both to original papers and patent literature up to so recent a date as the end of last year are given, and, in addition, a detailed author, subject and patent index is included, the extent of which may be gauged by the fact that it occupies twenty small-type pages of the volume.

Although the price of the book is high, it must be remembered that it is not intended primarily as a text-book but as a work of reference, and as such, it should deservedly find a place in all libraries, both here and in America. The publishers deserve credit for their enterprise in taking up the publication of this type of specialised work, and also for the admirable manner in which it has been printed. It is practically free from typographical errors and such as do occur are so obvious as to be completely unimportant. It is to be hoped that Mr. Hollins will follow this volume with another dealing with *poly*heterocyclic nitrogen compounds, the literature on which is likewise scanty and difficult of access.

J. M. H.

THE SIMPLE CARBOHYDRATES AND THE GLUCOSIDES. By E. Frankland Armstrong, D.Sc., Ph.D., F.R.S., F.I.C. Fourth edition. London: Longmans, Green and Co., 1924. Pp. 293, price 16s.

The fourth edition of Dr. Armstrong's well-known monograph appears at a singularly opportune moment in the story of carbohydrate chemistry. The classical work of Emil Fischer had resulted, before his death five years ago, in a practically complete elucidation of the relationships amongst the hexoses and their derivatives. These compounds are the units from which the more complex carbohydrates—cane-sugar, cellulose, starch, etc.—are built up, and the constitution of these complicated molecules was naturally the next problem demanding attention. Much of the earlier work in this direction has only recently received its correct interpretation, for the key to the problem lay in the methylation method originally devised by Purdie twenty years ago and applied so brilliantly by Irvine and his school. These researches are now bearing fruit, and in the five years which have elapsed since the third edition of Dr. Armstrong's book many notable contributions to our knowledge of carbohydrates have been made. The fourth edition is on this account almost a new book. The new matter is not to be measured merely by the increase (54) in the number of pages, for some portions of the third edition have now been omitted, formulæ have been rearranged, and certain sections have been entirely rewritten. A chapter on the chemical nature of cellulose, starch, glycogen and inulin has been added, and amongst other additions which bring the work well up-to-date are included notes on the structure of α-, β- and γ- glucoses, the hexosamines, glucose mono- and di- acetones, glucal, 2-deoxyglucose, glucosan, primeverose, procellose, Baly and Heilbron's photosynthesis of formaldehyde, the behaviour of sugars in the blood, and of course the numerous applications of the Purdie-Irvine methylation method. In view of the importance of 2:3:6-trimethylglucose, it is to be regretted that so little space is given to the proof of its structure.

As in previous editions the references are collected at the end of the book in the form of sectional bibliographies, an arrangement which has advantages but also, in the absence of an author index, serious drawbacks. In the present edition these bibliographies are considerably enlarged.

C. H.

ANILINE AND ITS DERIVATIVES. By P. H. GROGGINS, Member of the American Institute of Chemical Engineers. London: Chapman and Hall, Ltd, 1924. Pp. 256. 18s. net.

This is essentially a monograph on the manufacture of aniline from benzene. The treatment of the derivatives of aniline (sulphanilic acid, paranitraniline, alkylated anilines, phenyl glycine, etc.) is comparatively scanty and mostly on the usual lines. But the preparation of nitrobenzene and aniline is described in such detail and with such abundance of auxiliary data, chemical and physical, as recalls the publications of the late Ministry of Munitions on trinitrotoluene, phenol and picric acid. Specially valuable are the chapters on the comparative costs of the various possible processes for the isolation of the aniline from the reduction mixture and on the cost factors over the whole process. The author is evidently perfectly familiar, from personal experience, with the manufacturing processes he describes. But in dealing with the purely chemical side of the subject he shows less confidence and lucidity. Thus, for instance, his discussion of the mechanism of the reduction reaction is not clear, and there seems to be little justification for dealing with ferrous chloride as a reducing agent in a separate chapter fifty pages later. Again, his discussion of the composition of the nitrating acid for nitrobenzene is quite inadequate. The interesting information is given that about 20 per cent. of the total American aniline production is used in the rubber industry in the form of vulcanising accelerators. This justifies the author is devoting a section of the book to the preparation of thiocarbanilide, nitrosodimethylaniline and several other aniline derivatives which are commonly used for this purpose. In view of the amount of new information it contains, the book is a substantial and valuable addition to the literature on the dyestuff and fine chemical industries.

A. D.

Some Results of Research Work in Indian Forestry

Treatment of Timber for Industrial Purposes

An Indian correspondent gives below an interesting account of research work on Indian timbers, and the industrial advantages arising from their successful chemical treatment for various purposes.

THE Forest Research Institute at Dehra Dun in India may be said to be one of the important institutes in the British Empire. It is doing a considerable amount of valuable research of a solid character which should prove highly useful to the development of the forest industries of India.

Timber Seasoning

The most important section of the work is that connected with timber seasoning. Research as regards this may be said to have entered a new phase with the provision of buildings for the new experimental seasoning kilns with complete installation of the mechanical equipment. An important piece of investigation that is in progress is the air-seasoning experiment started on a commercial scale in the Government Agent's timber depôt in Calcutta, with eight important timbers from Bengal and Andamans to determine (a) the length of time required for the air-seasoning of various timbers under moist climate conditions; and (b) the amount of depreciation due to cracking, splitting, staining, etc. Definite figures as to these items are totally lacking for Indian timbers, but are of primary importance in determining the relative economy of kiln and air-seasoning. As the experimental kilns are already in operation, figures pertaining to kiln-seasoning are also being accumulated.

Another important scheme in which experiments have already been initiated is the one to determine for the Government Gun Carriage Factory at Jubbulpore the most economical procedure to follow in the seasoning of their timber. Experments with 3½ Sisso (Dalbergia Sissoo) planks and felloes carried out so far go to show that the timber can be kiln-seasoned in two months' time to a point of equilibrium with dry climate conditions of the Central Provinces, with practically no loss whatever due to cracking, splitting, etc. The very marked reduction in the seasoning time by kiln-seasoning will benefit the factory by reducing its capital outlay in timber by lakhs of rupees.

Perhaps the most important factor governing the introduction of new species of Indian timbers into the market is the question of proper seasoning and grading. The suppliers and users of timber are reluctantly being forced to recognise the importance of adopting correct methods of seasoning their timbers by repeated failure and loss of trade. This being the case, work in this section deserved to be developed to the utmost. It is satisfactory to note that this section has been doing most excellent work, and is now well on the way to tackling the most important of all utilisation problems, namely, the proper seasoning of timbers in India.

Wood Preservation

Allied to timber seasoning is the work in connection with wood preservation. The work of years at this subject is now bearing fruit, as the railways have accepted the use of treated sleepers, while some systems have put up treating plant, and others are actively engaged in schemes to do so. The North Western Ra lway is treating large quantities of sleepers with creosote in open tanks, and has erected a large pressure plant, which should soon be in operation. The Assam Railway Trading Co. has also erected a pressure plant and sleepers are being treated in open tanks in Southern India, while several other railways have projects on hand to treat their sleepers themselves. There remains a very important side to this inquiry which has still to be undertaken, and that is to carry out absorption tests and to determine the most economic methods of treating the many species of Indian timbers mechanically suitable but deficient in durability, unless treated for sleeper work. The experimental pressure plant purchased some years ago by the Forest Research Institute has now been erected, tested, and found to answer the purpose admirably. It is so designed that timber can be treated by all well-known methods except the Card Process.

One of the most notable achievements is the success of an experiment in the preservation and durability of sleepers by the wood preserving oil Avenarius Carbolineum. For a long time the experiments were being conducted on a laboratory scale. But large scale experiments were started about three years ago; 25,000 sleepers of five different species of wood treated with the oil Avenarius Carbolineum were laid down in different localities in railways in different parts of India. The pieces have now been in the ground for about two years, and it is interesting to note that none of the treated specimens has yet shown signs of decay or been attacked by white ants.

Timber Testing and Wood Technology

The importance of timber testing may be gauged by inquiries made by bodies and persons with widely different interests and spheres of action. Tests were carried out on behalf of the Burma Railways to determine the best size hole to bore in Pyinkado sleepers (*Xylia dolabriformis*) for spike-driving, while bending tests on bamboo lance-shafts were carried out for the Inspector of Guns and Rifles, Ishapur. A long series of tests were carried out to find substitutes for hickory for oil well Sucker rods, and definite and satisfactory results were obtained and submitted to the Indian oil companies concerned. Tests on hammer handles were carried out for the Government Woodworking Institute, Bareilly, and a further supply of new timbers has been received with a request that similar tests be carried out.

During the past year, no fewer than 11,000 tests were carried out, which comprised: (1) the completion of preliminary tests on Sucker rods; (2) the completion of preliminary tests on plugs for Stent concrete sleepers: (3) a series of spike-pulling tests on railway sleepers; (4) impact tests on hammer and implement handles; (5) comparative tests along routine lines of *Frenela rhomboidea, Eucalyptus globulus, Cullenia excelsa, Cupressus torulosa, Kayea assamica, Lagerstroemia tomentosa, Pentace burmanica, Cupressus macrocarpa* and *Cryptomeria japonica*.

A new type of spike-pulling meter and a modified type of compressometer have been designed by the Timber Testing Officer. The former has only been calibrated and not yet tested, while the latter after calibration has been put in use and found to be most satisfactory.

In wood technology, the research work in hand comprises: (1) the preparation of keys for the determination of timber specimens in the field based on microscopical features, as seen under a pocket lens; (2) the same, based on microscopical characters for critical determination in the laboratory; (3) the preparation of a syllabus for use in teaching wood anatomy to the Provincial Class Students.

Utilisation

There is large scope for work under this head. Forest industries in India do not in fact as yet exist, but research will assist development.

The scheme to establish an industry in *Boswellia Serrata* gum oleo-resin in the Bombay Presidency is still under consideration, and the work in this connection is being actively prosecuted. The up-to-date steam distillation plant for producing "Rosha oil" from *Cymbopogon martinii* grass in the Central Provinces, which was erected two or three years ago, has proved a success and may now be considered an established fact. The tests carried out to find woods suitable for sucker rods definitely showed that *Terminalia tomentosa* and *Heritiera minor* can be used as substitutes for hickory. Much interest has been taken and a large number of inquiries received in connection with match-making, owing to the high import duty now imposed on foreign matches. Most of the Indian timbers which have been tried have proved to yield poor quality splints. It is possible that better results may be obtained with these woods by using a slicing instead of a rotary machine.

In connection with paper pulp, some good work is being done. Experimental pulp plant has been erected with a digester of approximately 15 cwt. capacity, and an up-to-date 36-in. experimental paper machine. The plant is already in working order. At the request of the Bihar and Orissa Government the officer in charge of paper pulp visited the Cuttack and Angul forests with a view to determining the feasibility of starting a bamboo pulp scheme in that locality.

The subject was carefully worked out and a detailed report submitted to the Local Government which indicates a promising commercial proposition. A considerable amount of laboratory work was carried out in connection with bamboo and grasses, which will be of great value when large scale experiments are started with the new experimental plant now erected on the new site.

An exhaustive inquiry into the tan-stuffs of the Mangrove forests round about Mergui in Lower Burma has been completed.

A Year's Government Research

Annual Report of the Department of Scientific and Industrial Research

The following notes cover the main points of chemical interest in the Report of the Committee of the Privy Council for Scientific and Industrial Research for the year 1923-24, which has just been published by H.M. Stationery Office. Pp. 140. (3s. net.)

THE report of the Department of Scientific and Industrial Research, which has just been issued for the year 1923-24, contains a record of advancement in many directions. It is interesting to note that the estimated expenditure for the coming year is £328,281, an increase compared with the figure of £276,863 for 1923-24 and £297,437 for 1922-23. Grants to research associations have been on a gradually diminishing scale, with the exception of the British Scientific Instrument Research Association, the underlying idea being that these associations work to secure the self-independence of the various industries, and as this result is gradually attained the need for support diminishes. The sum of £10,000 a year for five years has been granted to the scientific instrument industry for research on condition that the industry subscribes yearly sums of £1,500 in the first to £2,500 in the fifth year. The number of industrial research associations in operation is 23, and in addition one is in process of formation for the sugar industry.

The National Physical Laboratory spent £162,290 during 1923-24. Of this sum, £47,685 was provided from fees for tests, etc., and £26,602 from payments by various departments for work undertaken on their behalf. The expenditure on the work of the Fuel Research Board was £46,391.

The Late Sir George Beilby

The death of Sir George Beilby deprived the Council and the Department of the greatest authority in the country on the problems of fuel research. He was one of the original members of the Advisory Council, and it was to him that the organisation and building of the Fuel Research Station at Greenwich was due. The report contains also a most appreciative reference to his work on behalf of low temperature carbonisation and other matters.

Patents by Government Servants

It has been decided by a Special Commission of the Treasury that every invention made by Government servants must be referred to the Board of Trade for advice on its commercial exploitation. During the year 30 applications have been filed by the Department, including six relating to the protection of aluminium from corrosion by producing a film of oxide on the surface of the metal. This film can be coloured, and specimens of sheets treated in this way have attracted considerable interest at the British Empire Exhibition.

British Empire Exhibition

Five aspects of the work of the Department are represented by exhibits at the British Empire Exhibition. In the Government Pavilion the Geological Survey and Museum and the Fuel Research Board have illustrated some of the features of their work; while the Food Investigation Board and the Building Research Board have provided small exhibits in the Food and Buildings Sections respectively in the Palace of Industry. The National Physical Laboratory has a stand in the Palace of Engineering, the space for which has been provided by the British Engineers' Association. The expenses of the exhibits are being met by the Department of Overseas Trade from funds made available by the Treasury for Government exhibits.

The Department has also been concerned indirectly with the central scientific exhibit organised by the Royal Society in the Government Pavilion.

National Physical Laboratory

A full report is given of the various activities of the National Physical Laboratory. In the metallurgical department research has been carried out on alloys of various kinds and experiments have been made on the die-casting of aluminium. The preparation of standard samples of steels for analysis blanks has been continued.

Fuel Research Board

The general work of the Fuel Research Board shows signs of a gradual development, a small increase has been made in the staff, and an Assistant Director has been appointed.

One of the most important aspects of the work of the Board is in the physical and chemical survey of national coal resources which has been undertaken. The idea here is to find out the best means of utilising various kinds of coal, and considerable progress has been made in the work of examining and tabulating the various characteristics. In one case it was found that in a seam used for producing metallurgical coke there was rather a high percentage of sulphur, which seriously diminished its value. This was found to be caused by a high sulphur content in one particular band, which is now discarded by certain collieries. The investigations include carbonisation of coals at low and high temperatures, and a report has been issued on "The Steaming of Wigan Arley Coal in Vertical Gas Retorts." Investigations of other coals are in progress.

Low Temperature Carbonisation

Experiments by the Board on low temperature carbonisation are being continued, but the progress has been somewhat disappointing. The Board has kept in close touch with private firms working similar processes, most of whom have kept the Director fully informed of the progress made, thus securing co-ordination of results in this important experimental development. The Lessing process has been successfully extended to the separation of low temperature tar into light spirit, heavy oils and pitch. The heavy oil so obtained is miscible in all proportions with fuel oils from natural petroleum.

Power Alcohol

The Fuel Research Board has also been carrying out some most interesting experiments on the production of power alcohol from the sugars obtained by the hydrolysis of cellulosic materials such as straw of various kinds. Though severe difficulties were encountered these are said to have been partly overcome. Attempts are also being made to ferment cellulosic materials direct, but without any great success as yet. Other possible sources of alcohol in the Empire are also being closely watched, and memoranda have been drawn up relating to cassava, yams, and sweet potatoes.

Oils and Fats Committee

The Oils and Fats Committee has examined a series of glycerol methyl esters, and has characterised sufficient to enable the constitution of any mixed glyceride to be determined. The chemistry of canned foods is being studied at Cambridge, and the production of volatile decomposition products has been investigated.

Forest Products Research

Work done for the Forest Products Research Board includes a thorough investigation of the chemistry of wood. The programme provides for the natural and derived products, together with the needs of paper pulp research and research on fungicides and wood preservatives.

Formaldehyde

The Chemistry Co-ordinating Research Board has continued its various investigations. Large scale trials of the slow oxidation of hydrocarbons for the production of formaldehyde gave rather low yields. The apparatus has been improved, but the experiments are at present held over until the investi-

gation on the concentration of weak formaldehyde is completed. Methyl alcohol has been shown to have a marked influence on the formaldehyde vapour pressure of aqueous formaldehyde solutions, and this is being investigated by further experiments. The attempts to prepare formaldehyde synthetically from carbon monoxide or dioxide and hydrogen have been suspended, but, in view of the statements in recent literature that given suitable catalysts at high pressures an oil product is obtained containing methyl alcohol, the Board is considering the reopening of this research.

The conditions for the production of carbon tetrachloride by chlorination of methane have determined at the Royal Naval Cordite Factory, and experiments are now in progress to find the conditions required to produce methyl chloride.

The Oppau Explosion

The results of investigation of the causes of the Oppau explosion of ammonium sulphate and nitrate were communicated to the Faraday Society in April (see THE CHEMICAL AGE, April 19, p. 408). The report of the committee appointed by the Reichstag, since received, also stated that the committee was unable to establish the cause, and the conclusions were in very close agreement with those of the Chemistry Board. It was, however, suggested that although the formation of a layer rich in nitrate was not probable, this appeared to be the most likely cause of the explosion.

Oxygen Research

The work of the Oxygen Research Committee, although now dissolved, has been carried on by the Air Ministry Oxygen Laboratory and Mr. B. Lambert at Oxford. The investigations have dealt mainly with vacuum vessels, and it is hoped that the gaps in the knowledge of this subject will eventually be filled as a result of this work.

A New Fish Oil

Oil containing a high proportion of a hydrocarbon has been obtained from certain fish, not at present brought to the markets, and the Board has recommended a grant to Professor I. M. Heilbron, of Liverpool University, for research on this oil.

The Relation of the Laboratory to the Works

By the President of the Society of Chemical Industry

On Friday, October 3, at a meeting of the Manchester Section of the Society of Chemical Industry, the President (Mr. W. J. U. Woolcock) delivered the first of a series of addresses to the sections, taking as his subject "Chemistry and Industry." There was a good attendance, which included members of other chemical organisations.

IN welcoming the President to Manchester and in thanking him for choosing Manchester as the first section to be visited, the Chairman (Dr. Levinstein) said that Mr. Woolcock had had many distinguished predecessors as President, some great men of science, others great chemical manufacturers or great technologists. Mr. Woolcock was not of these; he was a great personality and a great organiser. By these gifts he had rendered distinguished service to the chemical industry of the country. His work at the Association of British Chemical Manufacturers had been the main factor in the development of that powerful association. A striking tribute to the authority and usefulness of the A.B.C.M. was the fact that for the first time British chemical industry and chemical science united in producing a combined display at Wembley. The A.B.C.M. took over all the arrangements for this collective exhibit. It included the pure science exhibition, for the success of which the co-operation of all the purely chemical societies, including the Royal Society and all the academic bodies, was essential. When he told them that the result was not only successful, but that there was at no time any friction, a most unusual experience to those organising this kind of thing, they would realise that a human catalyst was at work amongst them in the person of the President. (Applause.)

The distinguished services rendered by Mr. Woolcock to chemical industry make him a most suitable person to carry on the great traditions of that Society. He was not sure, however, that the Council were considering a compliment to Mr. Woolcock so much as they were regarding their own necessities. At the present moment the Institute of Chemistry, the Chemical Society, the Society of Chemical Industry, and the British Association of Chemists, as well as other societies, all catered for the needs of chemists. To each of those Societies annual subscriptions required to be paid by the members, amounting in the aggregate to a considerable sum. In the case of the Society of Chemical Industry and the Chemical Society, who had expensive publications to maintain, the financial burden was increasing. There was a scheme for correlating the work of all the societies, which they hoped would reduce the number and amount of subscriptions to be paid. The object was to prevent overlapping, to secure administrative economy while maintaining the value of the publications. The scheme which visualised all the societies with their libraries and the Chemical Industry Club housed in the proper Chemistry House was yet undefined. There were many vested interests, many difficulties to be overcome. He could think of no one so well qualified as Mr. Woolcock to take the lead in these difficult matters.

The Chairman concluded with a tribute to the excellent work of Mr. Guy Radcliffe, the hon. secretary of the section, and congratulated him on his restoration to health.

Scientist and Industrialist

Mr. WOOLCOCK, in a brief reference to the Society of Chemical Industry, said that in the addresses which had been arranged he hoped to say a good deal about the policy of the Society in its domestic relations and in its relations in the numerous other societies, both scientific and industrial, which represented both pure and applied chemistry.

The first point he made was that for the benefit of the nation there must be the closest working together of the scientist and the industrialist. This needed emphasising at the present time. Immediately after the war they had no difficulty in realising the interdependence of scientist and industrialist. To-day there was a tendency not to insist on this interdependence as much as formerly. The boom in trade which followed immediately after the war found British chemical industry at its high-water mark. Chemists found employment easily. The industrialists had no difficulty in realising the necessity for a sufficient staff of chemists. The value of research work was realised as never before. Then came the slump, which hit chemical industry in common with all other industries although not as severely as some others. Economies had to be effected in all departments and much work which was not of a character immediately remunerative was stopped. No doubt every chemist present felt that the economies which had to be made were begun in the wrong place. It was only human for them to feel that they were the most indispensable of all the units employed in a chemical works. He contended that the chemist was most indispensable, but it would be easier to sustain this contention if the relationships between scientists and industrialists were closer.

The lack of a proper appreciation, the one of the other, between scientists and industrialists, was due to one of the weaknesses of human nature. "Looking around," the speaker said, "you will find men with really first-class scientific brains who with their gifts for original chemical investigation are a national asset. They appear to be utterly unconscious of this, but would agree with you if you suggested that politics, finance, industry or organisation work is their true forte. The same thing is true of the business man. Those industrialists who have made good to-day and are likely to retain their positions have among them men who are quite ready to take on the work of a scientist, or a politician, or a financier, and as for the work of an organiser—there is nothing in it. This weakness for attempting to do the other man's job should be combated. If the close co-operation which has developed between scientist and industrialist is to be maintained we must each of us have a little better appreciation of the work we are engaged upon and not be too ready to undertake other work in the mistaken idea that, although we have not been trained for it, some spark of genius has made us more com-

petent to undertake it than the man who has spent his life at the job.

Science plus Common Sense.

"I come in contact with a number of our younger men at the period when they have just finished their training and are looking for some work in the industry. In talking to them I am never left in any doubt as to the excellent amount knowledge they have obtained. What I am sometimes doubtful about is how far in the course of their training they have been taught to use their common sense. The industrialist pays more for common sense and manipulative skill than he does for mere scientific knowledge of a subject. If we are to bring the two sides more closely together we must not allow the enormous range now covered by the science of chemistry as taught in our Universities and colleges so to occupy time that there is none left for the practice of clear thinking and the exercise of common sense. A scientific training is not necessarily a handicap in business. Indeed, I find more and more of our best manufacturing firms are taking well-educated young men, often with a University training, and making of them most excellent business men. The experience of one of the best known firms in Manchester confirms this opinion and an interesting case came under my own observation. A young man, a mathematical scholar of Cambridge, came to me about a year ago looking for work. As far as I could see he had no technical qualification whatever, and I told him so. Whereat he rose in his wrath and demanded how I dared penalise him merely because he had a good mathematical brain. I was so impressed by his turning of the tables on me that I found him a very humble subordinate position in the office of a member of my association. I anticipated he would not survive the drudgery for three months. I am very glad to say that he is still there and if he continues on his present lines will make a very good position for himself.

"But let us look on the other side of the picture. I think the industrialist has been very much responsible for the long time it has taken to eradicate the idea from some minds that there are two kinds of science—pure and applied. And yet how many years ago was it when Huxley said that "What people call applied science is nothing but the application of pure science to particular classes of problems." The chemical manufacturer is apt to consider that the applied science which he practises differs in some way or other from the pure science of the chemist. This misunderstanding militates against the co-operation for which I am pleading. The industrialist, particularly when times are bad, is apt to consider any research which is not directed to the solution of some urgent problem which has arisen in his works as a waste of time. I have read somewhere that "discoveries in applied science may produce a reformation, but those in pure science lead to revolutions." The industrialist may reform his process, but if he goes a step further he may have such a discovery made in his laboratories as will revolutionise his whole business. In the intense world-struggle for business with which we are face to face, it is the revolutionary discovery to which we must look for help. We need reminding that while some discoveries have been born out of the necessity of finding an answer to a problem, far greater in number and subsequent importance are those which have been made in researches undertaken for the extension of our knowledge."

Mr. Woolcock went on to describe the great advances in bringing together the scientist and the industrialist which had been made in recent years. The formation of the Association of British Chemical Manufacturers had been of use in this connection. It had brought the manufacturers into such close contact that it had tended to level up the ideals of the less progressive to those of the more enlightened. The gain to the manufacturers had been obvious, but there had been an equal gain to the scientists, not perhaps quite so obvious. It was a threefold gain. First, the progress of the industry was essential if employment was to be found for all those who were being trained as chemists. Secondly, the success of co-operation among the units of the industry tended to foster co-operation between the different branches—technical and non-technical—in the same firm. And, thirdly, the levelling-up of ideals due to co-operation among the manufacturers made for better conditions for the chemist. The joint meetings of local branches of the various societies had assembled together the research chemists in University laboratories and works laboratories, the chemists from chemical factories, and the industrialists who were members of the Society of Chemical Industry. This was all to the good. In the present stage of fierce international competition there was no room for petty differences between societies of any nation, but it was the time for a uniting together of all the national societies. He must leave for another occasion the part which he believed the scheme for a Chemistry House must play, but he believed it to be an essential step to further co-operation between the Societies.

There had, however, been one other factor which had overshadowed all others this year in stimulating co-operation between science and industry—the British Empire Exhibition. In the early days of preparation for the Exhibition no provision was made for scientific displays. It was a question of money, and neither the Government nor the Exhibition authorities seemed willing to provide it. It was to the everlasting credit of British Chemical Science and Industry that at this point the decision was taken that chemistry should be represented even if no other science were there, and that chemistry would finance its own exhibit. He liked to think that this decision had considerable influence on the Government, which ultimately, through the Department of Overseas Trade, provided funds to enable other sciences to be shown at the Exhibition.

After reviewing in detail the splendid co-operation which had made the Chemical Section at Wembley so conspicuous a success, Mr. Woolcock concluded :—"I think I have said sufficient to-night to convince you that the results already obtained by the closer co-operation of those engaged in chemical science and chemical industry have amply justified the efforts which have been made. I believe it to be the settled policy of your Council to continue these efforts. The branches of the Society are on the threshold of a new winter session, and the Council is anxious that in every branch it shall find support for this movement. I am confident we shall not look in vain to Manchester." (Applause.)

The proceedings closed with a vote of thanks to Mr. Woolcock, proposed by Dr. Crossley, of the Shirley Institute, and seconded by Mr. Edwards, President of the Manchester Pharmaceutical Association. There was no discussion.

On Wednesday evening Mr. Woolcock visited the Nottingham Section and delivered an address on "Publicity in Chemical Industry."

Benn Brothers' New Headquarters

Among the buildings in Fleet Street, London, that are at present being demolished is a block between St. Dunstan's Court and Bolt Court, which Benn Brothers, Ltd., of Bouverie Street, publishers of The Chemical Age and other trade and technical journals, have acquired as a site for their new building. The block is famous for its association with Dr. Johnson, who lived at one time close by in Johnson's Court, which, however, derives its title, not from him, but from an Elizabethan citizen of that name. Here he edited his Shakespeare, and in Gough Square, just behind Benn Brothers' site, he compiled his famous dictionary. Bolt Court, the scene of the great man's death, forms the Eastern boundary of Benn Brothers' new premises. Besides the doctor, many other names are associated with the houses close by. William Cobbett, Theodore Hook, the libellous editor of an earlier *John Bull*, and Pinchbeck, the maker of musical clocks and inventor of the metal that bears his name, were also associated with the new site. Close by, too, is a house in Bolt Court some 200 years old some part of which was built from the headstones from a dissenters' burial ground which it displaced. An old plague pit also is said to have been dug close by.

The history of the firm of Benn Brothers, Ltd., is interesting. Originally the publisher of a single paper, *The Cabinet Maker*, which he started in 1880, Sir John Benn, the founder, well-known as an active member of the L.C.C., became, before he died, one of the biggest publishers of trade papers in the world. In 1916 the firm moved from Finsbury Square to Bouverie Street, and now owing to the growth of their general business and the expansion of their book publishing company, Ernest Benn, Ltd., are building larger premises on the site in Fleet Street, where demolition has already begun.

The American Dye Industry

Post-war Developments and New Dye Productions

THE annual report of the United States Tariff Commission on the Census of Dyes and Coal-Tar Chemicals for the calendar year 1923, shows a record output for the year with conspicuous progress in the production for the first time of many important dyes and other synthetic organic chemicals, as well as a further reduction in selling prices.

The domestic production of dyes in 1923 by 88 firms was 93,667,524 pounds, the largest in the history of the domestic industry. During 1922 the output by 87 firms was 64,632,187 pounds. The total sales for 1923 were 86,567,446 pounds with a value of $47,223,161. The production in the year 1914 by 7 firms was 6,619,729 pounds, valued at $2,470,096. The output was then dependent upon foreign countries, as most of the intermediates were imported—chiefly from Germany.

Production of New Dyes

During 1923 nearly 100 new dyes were produced, and in addition, other dyes, which had been imported previously in small quantities, were manufactured on a substantial commercial scale. New products include dyes for silk, cotton wool, colour lakes, and other purposes, and are representative of the different classes of dyes by chemical classification. The domestic industry, although deficient to some extent in the production of certain vat dyes and other colours, supplies over 95 per cent. of the domestic requirements. The production of vat dyes (other than indigo), in 1923, was 1,766,383 pounds, the largest in the history of the industry, an increase of 690,391 pounds over that of 1922, and the production of synthetic indigo during 1923 was 28,347,259 pounds.

During the year dyes produced in the United States supplied about 96 per cent. of the apparent consumption of coal-tar dyes, and there was, in addition, an exportable surplus of certain dyes amounting to about 18,000,000 pounds. The output of dyes in 1923, grouped by classes according to the method of application, was as follows: Acid dyes, 12,498,817 pounds, or 13·34 per cent. of the total output; basic dyes, 4,157,373 pounds, or 4·44 per cent.; direct cotton dyes, 16,858,387 pounds, or 18 per cent.; mordant and chrome dyes, 4,078,504 pounds, or 4·35 per cent.; sulphur dyes, 21,558,469 pounds, or 23·2 per cent.; vat dyes, including indigo, 30,113,642 pounds, or 32·15 per cent.; indigo, 28,347,259 pounds, or 30·26 per cent.; other vat dyes, 1,766,383 pounds, or 1·89 per cent.; lake and spirit-soluble dyes, 1,171,854 pounds, or 1·25 per cent.; unclassified and specialty dyes, 3,230,478 pounds, or 3·45 per cent. of the total.

Decline in Dye Imports

Total imports of coal-tar dyes for 1923 were 3,098,193 pounds, valued at $3,151,363, compared with 3,982,631 pounds, valued at $5,243,257 for the year 1922. The total imports during 1913, previous to the extensive development of the domestic industry, were 45,950,895 pounds. Of the total imports during 1923, 47 per cent. came from Germany, 28 per cent. from Switzerland, 12 per cent. from Italy, 6 per cent. from France, 4 per cent. from England, and 3 per cent. from all other countries. Dye imports for the year 1923, classified by method of application, are as follows: Acid dyes, 6,544,048 pounds; vat dyes, 1,207,554 pounds; mordant and chrome dyes, 453,415 pounds; direct dyes, 527,012 pounds; sulphur dyes, 114,023; basic dyes, 210,896 pounds; spirit-soluble and colour lake dyes, 23,213 pounds; and all other dyes, 18,030 pounds. Those shipped from Italy appear to be of German manufacture and are doubtless dyes delivered to Italy from Germany in reparation payment and later resold to the United States. Italy received up to December 31, 1923, 6,274,601 kilos out of a total delivery by Germany in reparation payment of 25,583,390 kilos of coal-tar dyes.

Increase in Exports

The exports of coal-tar dyes during 1923 totalled 17,924,200 pounds with a value of $5,565,267, compared with a total of 8,344,187 pounds with a value of $3,996,443 during 1922. This increase in the domestic exports of coal-tar dyes may be largely accounted for by the effect of the occupation of the Ruhr by the French, which resulted in a decreased production of dyes in the German factories and gave an opportunity to increase exports to the Far East.

Before the war, Germany had an output totalling three-fourths of all synthetic dyes produced. Of the remaining one-fourth, one-half was made from German intermediates, and its production was accordingly dependent upon Germany. Switzerland, although without a domestic source of raw materials, ranked second, with about 7 per cent. of the world's production. Great Britain produced about one-tenth of her requirements, and France produced in French-owned and operated plants from 10 to 15 per cent. of her consumption. The small dye industry of the United States was almost entirely dependent upon intermediates from Germany.

Post-war Activities

Owing to the acute shortage of dyes due to the disappearance of German dyes shortly after the beginning of the war, the manufacture of dyes was soon entered upon in the United States, Great Britain, France, and Italy, and each of these countries has developed a dye industry capable of supplying from 80 to over 90 per cent. of its requirements and has, in addition, exported significant quantities of dyes since the war. The world's present capacity to produce dyes is nearly double that of the pre-war period and the estimated annual capacity to produce dyes by the seven leading producers—Great Britain, Germany, United States, Switzerland, France, Japan, and Italy—is considerably in excess of 600,000,000 pounds. The maximum estimated or officially reported output of the seven leading dye producers is as follows:—Great Britain (1920), 43,000,000 pounds; Germany (1913), 280,000,000 pounds; United States (1923), 94,000,000 pounds; Switzerland (1920), 24,000,000 pounds; France (1923), 24,000,000 pounds; Japan (1919), 16,000,000 pounds; and Italy (1922), 10,000,000 pounds. This existing capacity to produce over and above normal requirements is resulting in an era of severe competition in the world's markets, which may eliminate many of the plants now in operation. In 1913, the German export of synthetic dyes amounted to about 240,000,000 pounds, with a value of about $52,000,000, while in 1922 it amounted to about 114,000,000 pounds, with a value of about $80,000,000. For the year 1923 exports from that country totalled about 74,000,000 pounds, with a value of about $17,000,000 (1913 basis) or $42,000,000 (1923 basis).

The occupation of the Ruhr in 1923 resulted in a reduced production of dyes in Germany. The total output in 1923 was about 145,000,000 pounds, as compared with 193,000,000 pounds in 1922. The effects of the occupation of the Ruhr had largely disappeared in the early part of 1924 and German dyes again offered sharp competition in the markets of the Far East.

Coal Tar Products

The total output of colour lakes in 1923 was 13,079,115 pounds compared with 10,578,664 pounds in 1922. The total sales of colour lakes in 1923 amounted to 12,627,359 pounds, valued at $5,124,732. The 1923 production of coal-tar chemicals used as photographic developers totalled 343,289 pounds, compared with 345,798 pounds in 1922. Sales in 1923 amounted to 321,083 pounds, valued at $443,697.

The 1922 production of synthetic phenolic resins was 5,944,133 pounds; the figures for 1923 cannot be published without revealing the output of individual companies.

The output of synthetic tanning materials amounted to 1,910,519 pounds in 1922, but here again the 1923 production figures cannot be published. The total output of synthetic phenolic resins and synthetic tanning materials in 1923 was 9,763,685 pounds. Each of these classes of coal-tar products shows an increase in production for the past year. The total sales of synthetic phenolic resins and synthetic tanning materials for 1923 was 10,068,431 pounds, valued at $5,816,590.

The coal-tar intermediates are required not only for the manufacture of dyes but for the manufacture of explosives, medicinals, flavours, perfumes, photographic chemicals, synthetic resins, synthetic tanning materials, toxic gases and accelerators for vulcanisation of rubber. The total production of intermediates by 103 firms in 1923 was 231,393,871 pounds

compared with 165,048,155 pounds in 1922. The sales during 1923 totalled 83,582,808 pounds valued at $18,916,058. The total number of intermediates reported during 1923 was 311, of which over 80 were not reported during the previous year.

A new record for the output of by-product coke was established in 1923 and the total production exceeded 37 million tons. The total output of all coke during 1923 was 55,565,000 tons. Of this quantity 67·7 per cent. was from by-product ovens, and 32·3 per cent. from beehive ovens. In 1913 only 27·5 per cent. of the coke was produced by the by-product ovens, and 72·5 per cent. by the beehive ovens. The increase in the output of by-product coke has resulted in an increased yield of valuable by-products, including ammonium compounds for fertilisers and other uses; a supply of gas for industrial heating and lighting; a supply of coal-tar in excess of the requirements of the domestic coal-tar chemical industry. The output of coal tar in 1923 established a record, reaching 440,000,000 gallons, about half of which was used as a fuel. In general, there was an increased output of coal-tar crudes in 1923, conspicuous among them being motor benzol and naphthalene. The output of synthetic organic chemicals not derived from coal tar in 1922 was 90,597,712 pounds; the total sales amounted to 67,727,067 pounds valued at $13,875,521. The production in 1922 totalled 79,202,155 pounds.

Society of Public Analysts

Methods of Estimating Phosphorus and Nitrogen

AT the ordinary meeting held at the Chemical Society's Rooms, Burlington House, London, on Wednesday, October 1, Mr. G. Rudd Thompson, President, in the chair.

Certificates were read for the first time in favour of Messrs. A. C. Brooks, A.R.C.Sc.I., A.I.C.; W. Donovan, M.Sc. (New Zealand); A. G. Flower, B.Sc. (Lond.); C. Hollingsworth, F.I.C.; G. M. Norman, B.Sc. (Lond.), A.R.C.S., F.I.C.; C. E. Sage, F.I.C.; P. F. Spendlove, B. Sc., A.R.C.S., A.I.C.; C. W. Spiers, M.Sc. (Bristol), A.I.C.; L. H. Trace, A.I.C., B.Sc. (Lond.); and J. R. Walmsley, A.M.S.T., F.I.C. Certificates were read for the second time in favour of Messrs. J. E. Nyrop, Cand. Polyt. (Copenhagen University) and C. P. Thorpe, B.Sc. (Manch.).

The following were elected members of the Society:—Messrs. G. W. Clough, D.Sc. (Birm.); J. P. Shenton, F.I.C.; and W. S. Wood.

Abstracts of Papers

In a paper on "The Determination of Coconut Oil and Butter Fat in Margarine," by C. D. Elsdon, B.Sc., F.I.C., and Percy Smith, the authors discussed the methods which have been suggested for calculating the percentages of butter and coconut oil present in margarine from a consideration of the Reichert-Polenske-Kirschner process. They sought to show that a certain amount of uncertainty exists in these calculations and, from analyses of a large number of mixtures of known composition, to introduce some improvement. The Blichfeldt process was discussed and the opinion given that this has no particular advantage over the processes now generally is use. A modification of this process, suggested by the authors, is found to be inferior to the Kirschner process, though somewhat more rapid.

"A Preliminary Note on the Composition of the Fat of Goat's Butter" was submitted by F. Knowles and J. C. Urquhart, B.Sc., A.I.C. Owing to the increasing number of herds of goats in the country and consequent increase in sale of butter obtained from this source, the authors raised the important point whether or not it was legal for this product to be sold as "butter." Analyses were given of samples of the fat of goats' butters where the usual conventional methods were employed. Particular attention was directed to the Polenske value, which varies from 4·9 to 8·7, and which, if interpreted in the light of the usual standards for cows' butter, would erroneously be assumed to indicate adulteration.

"The Quantitative Estimation of the Degree of Hydrolysis of Gallotannin by Tannase" was the subject of a paper by Miss W. N. Nicholson, B.Sc., and D. Rhind, B.Sc. Tannase, it was pointed out, disintegrates gallotannin, gallic acid being produced. The activity of tannase can therefore be measured by estimating the unchanged gallotannin. Such a method has been devised by Rhind and Smith (*Biochem, J.*, 1922, 16, 1). It can also, however, be measured by estimating the amount of gallic acid produced by the enzyme. A method for the estimation of gallic acid produced by tannase has been described by Freudenberg and Vollbrecht (*Zeitschr. Physiol. Chemie*, 1921, 116, 277). In this method the gallic acid formed by the action of tannase on gallotannin or methyl gallate is estimated by titration with sodium hydroxide, litmus paper being used as an indicator. It is assumed by Freudenberg and Vollbrecht that, under the condition chosen by them, only the carboxyl group in the gallic acid reacts with sodium hydroxide. This method has now been tested and has been found not to be reliable. Concordant results, however, have been obtained by using a slight modification of Mitchell's colorimetric method for the estimation of small quantities of gallic acid (*Analyst*, 1923, 48, 2). This method has been in constant use during the last eighteen months in connection with the work on tannase and has been found to give good results.

In a paper on "The Pemberton-Neumann Method for the Estimation of Phosphorus," by Miss M. B. Richards and W. Godden, B. Sc., A.R.C.S., F.I.C., it was shown that the chief sources of error in this estimation are (1) absorption of CO_2 by the alkali used to dissolve the ammonium phosphomolybdate precipitate, and (2) the use of a wrong factor. Errors due to (1) may be eliminated by boiling with excess of acid before the final titration. (2) Instead of Neumann's factor 0·001268, the authors use the factor 0·001365, believing that the formula of the precipitate obtained by their procedure is $(NH_4)_3\ PO_4,\ 12\ Mo\ O_3$. The use of this new factor, combined with the method of precipitation and washing detailed in the paper, gives results in close agreement with those obtained by gravimetric analysis.

W. S. Shaw, M.Sc., A.I.C., submitted a paper on "Application of 'Formol Titration' to the Kjeldahl Method of Estimating Nitrogen." With a view to eliminating distillation the formol titration method was adapted to the estimation of nitrogen after the usual digestion with satisfactory results. The colourless solution is diluted and boiled to expel sulphur dioxide, neutralised and left slightly acid, and made up to 250 c.c. Twenty-five c.c. of the solution are rendered alkaline with N. sodium hydroxide solution, re-acidified with 0·1 N. sulphuric acid, boiled, cooled rapidly, and titrated with 0·1 N. sodium hydroxide solution with phenolpthalein as indicator. Five c.c. of formaldehyde solution (commercial formalin of determined acidity) are added, the mixture allowed to stand for a few minutes, and the acidity titrated with 0·1 or 0·2 N. sodium hydroxide solution. The acidity due to the formaldehyde solution is corrected for, and the nitrogen calculated.

Professor Hugh S. Taylor's Visit

PROFESSOR HUGH S. TAYLOR, of Princeton University, U.S.A., who has been granted six months' leave of absence to make a special study of University laboratory organisation and general industrial conditions in Europe, has already spent some time on this work in the North of England and on Tuesday next will leave England for an extended tour of European university and industrial centres. He will afterwards return to England to complete his investigations here before returning to the United States. His visit, incidentally, will enable him to co-operate with Dr. Eric K. Rideal in completing arrangements for the revision of their well known work on "Catalysis in theory and practice," which is shortly to be re-issued in a much enlarged form.

Durham's New Science College

SIR WILLIAM BRAGG, on Thursday, October 2, opened the new college of the University of Durham, the Department of Pure Science. The laboratories were inspected by a representative party. The accommodation provides for about 90 students. The head of the new department is Professor Irvine Masson, D.Sc., F.I.C., who will also be Professor of Chemistry. Other members of the staff include Professor of Physics, Mr. J. E. P. Wagstaff; Reader in Chemistry, Mr. A. Killen Macbeth; Lecturer in Chemistry, Mr. H. J. E. Dobson; Lecturer in Physics, Mr. Thomas Alty.

At the special Convocation the honorary degree of D.C.L. was conferred on Sir William Bragg.

French Chemical Industry Notes

[From Our Paris Correspondent.]

The synthesis of sugar in a way similar to that in which the green leaves of plants yield it is a discovery with which French chemistry has been long familiar. The fundamental experiment was made, in fact, 13 years ago. On December 12, 1911, M. Daniel Berthelot, the distinguished son of the eminent French chemist, made a communication to the Society of Comparative Pathology in which he stated that in his laboratory of vegetable physics in Meudon he had succeeded in reproducing the fundamental reactions of chlorophyllian synthesis in the absence of chlorophyl and of living matter and in conditions that strikingly recall those of Nature herself, that is to say at ordinary temperature, without the addition of foreign reagents, by allowing the simplest gases contained in atmospheric air to come in contact: water vapour, carbonic acid and ammonia.

Quartz tubes, each containing the essential elements of plant nourishment were placed at the top of a tower of the Meudon Observatory. As a consequence of this exposure the solar rays transformed the humid carbonic acid into hydrocarbons. M. Berthelot thus obtained the formation of vegetable principles without the intervention of any vital energy.

Sugar Synthesis With Ultra-Violet Rays

With the plants' own form of energy (light) M. Berthelot had realised a result inaccessible to the influence of the agents, heat and electricity, the effects of which are destructive to animal and vegetable tissue. The chemist is less favourably situated than the plant for utilising visible luminous energy. Plants contain ferments and cellular matters which acting as catalysts lower the chemical potential necessary to the reactions, thus permitting them to play their parts as synthesisers with the aid of the solar rays—particularly with the yellow or green rays. Nevertheless, so far back as 1911 M. Berthelot was sure that science would soon be in possession of this secret. Certain experiments with uranium salts as catalysts warranted this expectation.

But M. Berthelot aimed at achieving more rapidly the slow solar synthesis. By overcoming the chemical inertia of inorganic gases he strove, so to speak, to reduce months to minutes. Ultra-violet rays engendered by means of quartz lamps put him on the road to this realisation.

When a mixture of water vapour and carbonic acid are exposed to these rays the first effect produced is a double decomposition. The nascent oxide of carbon and hydrogen resulting from this unite to form the simplest of the carbohydrates. This formaldehyde condenses and polymerises to sugars, starches, cellulosic substances and ternary fundamental constituents of vegetable tissues. Sugar—the type of energy-creating animal food—is thus produced with facility from the gases of the air. This was pointed out by M. Berthelot more than a decade before the experiments now acclaimed in America.

New Industries of National Interest

The Alsatian Chemical Manufacturing Co. is increasing its capital from 30 to 50 millions. This measure is a preface to the creation in France of new industries resulting from the exploitation of recent foreign patents, the purchase condition of which are said to have been signed last month in Germany. For these manufactures which will be installed in Alsace independent factories are about to be built. They are declared to be "of the greatest possible interest from a national standpoint."

The company is credited with the intention of applying the principle of heavy tonnage production with small profits, but considerably increased turnover. Synthetic camphor is one of the products to which this observation refers. To this will be added more important and interesting enterprises. The Société Alsacienne de Produits Chimiques" has, in fact, obtained an option for an important exclusive licence for France, its colonies and for Belgium, which will render possible the synthetic manufacture of a series of hydrocarbons, some rare and expensive, others in almost universal use. The hope is entertained of solving the question of a national motor fuel. It is stated that the company with which the Alsatian Co. has been in negotiation supplied Germany—almost alone—during the war with fuel for heavy transports. This company has already sold the American licence to a firm which, in spite of the low price of petrol in the States, has had a most satisfactory experience during the first financial period.

German Nitric Acid

The Germans have once more begun to import into France their synthetic nitric acid. This development has slowed down considerably the French production which has been in a privileged position for the last year and a half. The general economic situation, which is bound to be rather unsteady until an economic understanding is arrived at with Germany, reacts on the chemical market and reduces its activity.

Sulphur and Rubber

Meeting of the Institution of the Rubber Industry

"Sulphur" was the subject of a paper read before the Institution of the Rubber Industry on Monday by Mr. Edward Anderson, A.I.C., at the Engineers' Club. Mr. Standring was in the chair and introduced the speaker.

Mr. Anderson dealt with the physical and chemical properties of the different forms of sulphur, which had been described as "the keystone of the rubber industry." No other substance was anything like so satisfactory in the process of vulcanising. There were many theories of vulcanising, some of which he referred to in detail. It was generally agreed that it was a purely additive process, and continuous in its effects—*i.e.*, the greater proportion of sulphur incorporated the greater degree of hardening was produced. The rate of combination of the sulphur was determined by the temperature and proportion of sulphur added. There was considerable evidence for the formation of polysulphides, but at temperatures above the melting point of sulphur it was a significant fact that a freshly vulcanised mix was transparent, becoming cloudy when cooled, suggesting the separation of solid sulphur.

The Phenomenon of "Blooming"

Referring to the phenomenon known as "blooming" or sulphuring-up, Mr. Anderson mentioned some recent work with the microscope which showed that this was caused by the formation of rhombic crystals of sulphur on the surface. The remedy was to avoid anything likely to act as a centre of crystallisation. In normal vulcanised rubber the sulphur was amorphous or in the form of dendritic crystals (probably monoclinic), but once the rhombic crystals appeared these grew at the expense of the other forms, leading to the sulphuring-up.

Sulphuric Acid in the Mix

In the course of the discussion, Dr. T. J. Drakeley made a number of critical observations. He said he thought it was a pity nothing had been said of the development of acidity in sulphur on storing. Sulphuric acid was the worst possible substance to introduce into a rubber mix. He had also expected to hear something about the formation of sulphur chlorides and their application.

Mr. E. Smith, of the Anchor Cable Co., pointed out that heat and pressure had a great influence on vulcanisation which the speaker had not referred to. Otherwise he was in agreement with his remarks, except that he did not believe the action of accelerators was catalytic.

Mr. Fordyce Jones made several interesting observations. He said he had discovered a way of obtaining an aqueous dispersion of sulphur, suitable for adding to latex, which was much easier to get than with any colloid mill, and that was by boiling it with an alkaline solution, such as sodium bicarbonate or borax. Referring to vulcanisation, he said that he thought it was high time some of our rubber manufacturers seriously investigated the question of how much or how little sulphur was needed to produce a given result.

Mr. E. Bruce Warren pointed out that "blooming" brought up the mineral particles in the rubber as well as the sulphur. With regard to the smell of H_2S, which was suggested as indicating chemical action in vulcanisation, he said it was never observed in practice, except sometimes in making ebonite, in which case the lot was discarded. Mr. R. R. Olin (U.S.A.) inquired whether the speaker's observations referred to all the forms of sulphur or only the rhombic form.

In reply, Mr. Anderson said that the rhombic form was the stable form, and in general what was true of that was true of the other forms because they tended to pass over into it at ordinary temperatures. In connection with Dr. Drakeley's remarks he said that flowers of sulphur alone tended to form acid on sorting.

Cracking of Petroleum

Dr. Dunstan's Paper before Petroleum Technologists

A PAPER entitled "Recent Developments in the Art of Cracking" was read before the Institution of Petroleum Technologists, in London, on Tuesday, by Dr. A. E. Dunstan, the paper being in the names of A. E. Dunstan and Robert Pilkethley.

Surveying the subject in general during the past eight years, Dr. Dunstan said that in the first place vapour phase processes working under practically atmospheric pressure had not been particularly successful; losses were high and the products poor in quality. On the other hand, exceedingly high pressure processes had not advanced far beyond the development stage. Most of the processes which had been utilised to any extent operated under comparatively moderate pressures of 300 to 400 lb. per sq. in. General observations appeared to point to the conclusion that, provided the pressure was sufficient to maintain the oil under operation mainly in the liquid phase, there was no particular advantage in extremely high pressure, as far as the quality of the product was concerned, as oils converted at pressures between 350 and 700 lb. appeared to have similar characteristics. Considering extremely high pressure processes like that of Bergius, it was apparent that hydrogen disappeared in certain cases, but it was questionable if the hydrogen was contained in the liquid products of lower boiling point.

The question of temperature in liquid phase cracking was decided by the particular oil under treatment and the amount of spirit desired, as there appeared to be a definite relationship between the three variables—time, temperature and yield. The percentage of spirit obtained after the oil had reached definite cracking temperature appeared to double itself, within limits, for an increase of temperature in the neighbourhood of 10° C. In the same way, when the rate of pumping was halved, or the time of reaction doubled, the same increase in spirit content was noted.

Problems of Engineering

There had not been a great advance in our knowledge of cracking from a chemical point of view during the last few years, and the problems connected with it had been more of an engineering quality. The most urgent problem to the majority of refiners was the elimination—or at any rate the diminution in quantity—of coke in order to allow plant to run continuously without having to close down periodically. Bergius claimed to have successfully overcome this problem, but to the majority of others the question was definite, and it was questionable if coke could be eliminated without hydrogenation brought about by one method or another.

Dr. Dunstan described some successful commercial cracking plants. As a typical vapour phase installation, he dealt with the Ramage plant. This had electrically heated cracking tubes, and the reaction took place over haematite, which appeared to remain unchanged.

The Dubbs Process

The most successful process was the Dubbs, which was a two-phase type, the oil being cracked in the liquid phase and then passing to the dephlegmators for separation. There were at present 113 units of plant in use or under construction at the present time. The reaction chamber was 15 ft. high and 10 ft. in diameter, having a capacity for 30 tons of coke. The working pressure was about 140 lb. per sq. in. and the cracking temperature was about 450° C. The Dubbs process was the only one which was cracking commercial fuel or topped crude direct without pre-treatment or distillation.

Dr. Dunstan also described the Cross process, which somewhat resembled the Dubbs, but differed in the actual form of the apparatus, the pressure (600 to 700 lb. per sq. in.), and the temperature (about 470°). Another recent development was the Carlton Ellis method which used vertical reactors, and in which pressure was maintained right through the system.

Dr. Dunstan also referred to an experimental process developed by himself with Auld and Herring. This aimed at producing the maximum quantity of non-gumming liquid fuel and the minimum of carbon and gas. It was a high pressure process working at 25 to 30 atmospheres. There were three stages, first the oil was heated to about 25° C. below the optimum decomposition temperature, then it was quickly raised to about 20° C. above this in a thermolyser consisting of narrow pipes. The oil then passed into the reactor where the decomposition was completed and most of the carbon deposited.

Hydrogenation Processes

Bergius found that by heating coal with hydrogen at high pressures a range of light and heavy oils was produced. He then applied this process to residual oils of high carbon content and found that at about 100 atmospheres initial pressure and about 450° C. he could obtain a range of light oils and practically no coke or gas. Commercial plant was developed, in which oil and hydrogen were sprayed continuously into an autoclave, the lighter products being removed rapidly and the heavier ones passing back for further hydrogenation. Heating was carried out by using hot nitrogen. Recent investigations by Dr. Dunstan and others seemed to indicate that the hydrogen actually did not have any active part in this process, as if it was replaced by nitrogen at the same pressure the nature of the products was essentially similar.

A discussion followed the reading of the paper, in which a number of members joined. Among these was Dr. Ormandy, who suggested that the present methods of comparing cracked and straight run spirits were of little value for practical purposes, and were in need of revision. Cracked spirits were often very suitable for use in motors in spite of their unsaturation because they could stand a higher degree of compression without detonation. On the whole cracking was now such a successful operation that there seemed no room for Berginisation. Dr. Mollwo Perkin produced some samples of a non-gumming light cracked spirit obtained by him in 1915 in a plant working at a pressure of 1,000 lb. per sq. in. He concluded that all successful processes required a high pressure. Dr. Thole drew attention to the need for further study of the chemical aspects of cracking, and pointed out that if the temperature was kept below a certain level a heavy tar was obtained instead of coke.

Synthetic Organic Glass

FEW classes of substance have aroused greater interest in recent years than the condensation products of the aldehydes with the phenols, which are known as the synthetic resins, and which have been so largely developed in the United States by the Bakelite Corporation, and to a less extent in this country and France by other concerns. A somewhat similar product, but transparent and colourless, has been developed by two Austrian workers, Pollak and Ripper. This is a condensation product of urea with formaldehyde, and it has now been perfected as a kind of glass, under the name "pollopas." An article in *La Revue des Produits Chemiques* of September 15 describes how the substance was evolved in a practical form from a U.S. patent taken out in 1918 by H. John for a water-soluble mucilage prepared from urea and formaldehyde. Pollopas is in the form of an insoluble gel, prepared with the addition of small quantities of alkaline salts to the condensation of formaldehyde and urea. It is perfectly transparent and appears to be a substitute for glass, with the advantage that it is comparatively soft and workable and may be coloured easily. Its optical properties are interesting, as it is possible to prepare it with refractive indeces of different values. It is also much more transparent than mineral glass to ultra-violet and infra-red rays. It is expected to find considerable uses in optical instruments, as well as for decorative purposes.

The Boverton Redwood Medal

AT the meeting of the Institution of Petroleum Technologists on Tuesday the announcement of the award of the Boverton Redwood Medal was made. This medal has been presented by Mr. Alexander Duckham for the best paper contributed during two sessions, in memory of the late Sir Boverton Redwood. It has been made retrospective to his death, and so for the sessions 1919-20 and 1920-21 it has been presented to M. Paul de Chambrier of Peschelbronn, for a paper on "Washing of Petroleum by Means of Shafts and Galleries," read before the Institution on February 15, 1921. For the sessions 1921-22 and 1922-23 there has been no outstanding paper, consequently no award has been made for this period.

The Student's Medal of the Institution has been awarded to Lieut. J. H. Blackistone.

Organisation of Chemical Societies

To the Editor of THE CHEMICAL AGE.

SIR,—In common with all other members of the Chemical Society, I have received a notice to the effect that there is to be a virtual increase in the annual subscription, in that an extra charge will be made for the Annual Reports, which have hitherto been supplied to members free of charge, and at the same time directing attention to the need for increasing the membership of the Society. I have little doubt that the result will be that many members of the Society will not purchase the Report; but as this publication appeals particularly to students, and as it is from men of this class that the Society should draw its new members, I fear that the new policy will defeat its own object.

I take this opportunity of directing attention to the position in which the lack of organisation in the chemical world places the younger men, and in particular those who are entering industrial life. The young industrial chemist may be expected to belong to the following organisations, and to pay the corresponding subscriptions, in addition to entrance fees, which I have not set down :—

	£	s.	d.
The Chemical Society	3	0	0
Institution of Chemical Engineers	5	5	0
Institute of Chemistry	2	0	0
Society of Chemical Industry	2	10	0
Faraday Society	2	0	0

The total amounts to an annual charge of nearly fifteen pounds and in addition there will be the subscriptions to be paid to one or more specialised organisations.

Between them these societies do not possess a library which is in any way comparable with the Patent Office Library, or a lecture hall which will accommodate even a moderately well attended meeting; no set of *abstracts* comparable with "Chemical Abstracts" of the American Chemical Society is published in the country. These are hard things to say, but it is time that attention was directed to the facts.

A recent attempt of my own to recruit for one of our societies met with failure, as my intended victim pointed out that "he had the use of the Patent Office Library free, and generally preferred to attack his chemical literature through the publications of the American Chemical Society." Will any chemist suggest a suitable reply? I have not been able to think of one.

When reorganisation of the societies connected with chemistry is suggested, it is always stated that it is impossible to raise the money which will be required. I have had a good deal to do with the raising of money for such objects, and there is one thing I know in connection with the matter. It is this. If you want to raise money you must show that you are spending what you have got economically. You must also show that you know what you want, and what you are going to do with the money when you get it. If, as is rumoured, schemes for reorganisation are under consideration, it is well that they should see the light of day in a form in which they can easily be understood, and as soon as possible.—Yours, etc.,

M. W. TRAVERS.

147, Queen Victoria Street,
London, E.C.4.
September 22.

The Mond Bequest Pictures

THE collection of Italian masters bequeathed to the nation by the late Dr. Ludwig Mond, one of the founders of Brunner, Mond and Co., was on view when the National Gallery opened on Tuesday. The pictures are described as "probably the greatest windfall to the Gallery since its foundation," and include excellent examples of the work of Botticelli, Raphael, Correggio and Luini.

Chemical and Engineering Society's Social

THE Hull Chemical and Engineering Society opened its winter session at Hull on Tuesday, October 7, with a successful whist drive and social. Mr. E. G. Hill, M.I.H.V.E., was responsible for the arrangements and prizes were presented by Mrs. T. G. Leggott, wife of the president of the society. The drive was followed by a musical programme.

Sulphate of Ammonia Plant Fatality

AN inquiry was held in the Manchester Coroner's Court on Thursday, October 2, into the death of Patrick Clinton, 40, of Gleden Street, Ancoats, Manchester, who was killed whilst following his employment as a labourer at the tar-distillation works of Hardman and Holden, Ltd., Varley Street, Miles Platting, Manchester. Evidence was given to the effect that Clinton was engaged, with other workmen, bagging sulphate of ammonia, the sulphate being dug from a stack containing five or six tons. Whilst the men were at work the stack suddenly collapsed and Clinton was almost completely buried. The base of his skull was fractured and he was dead when the ambulance reached the hospital. Evidence was given by the assistant manager at the works, who stated that his firm were actually engaged on the installation of a plant to operate a new process and that the stack on which Clinton was working was the last made under the old process. Witness stated that sulphate of ammonia was very hard and that the stacks had to be undercut, a log or pillar being left to hold up the top. When that support had to be removed iron bars were driven into the top and the workmen hauled on these with ropes. The method described had always been employed at the works and witness stated that there had not been a serious accident arising out of it for over fifty years. Mr. Higson said that in view of the record of the firm it could not be thought that any blame attached to them, and a verdict of "Accidental death" was returned.

New British Chemical Standard Steel

MESSRS. RIDSDALE AND CO. announce the issue of British Chemical Standard Carbon Steel "E" (B.O.H.) having the following standardised figures :—

Carbon .....0·114 per cent.
Manganese.....0·492 per cent.

This material has been specially prepared to meet the need for a widely recognised carbon (colorimetric) standard above 0·10 per cent., which is near to the maximum usually desired in tin-plate manufacture. It has the additional convenience of being a low manganese standard, so that those who prefer to determine the carbon (colour) and manganese from the same portion of sample may do so.

As usual the analysis has been conducted by a number of independent analysts, works' chemists, etc., (including the Bureau of Standards, Washington, U.S.A.) representing different interests. Bottles of standard turnings may be obtained from headquarters, 3, Wilson Street, Middlesbrough, at a fee estimated to be sufficient to cover the cost of preparation. Three sizes are now provided, viz., 500 gramme, 100 gramme, and 50 gramme. A certificate giving the names of the analysts co-operating, the types of methods used (including numerous notes thereon) and a detailed list of the individual analyses, will be supplied with each bottle.

Chlorine in Drinking Water

IN the eighteenth annual report to the Metropolitan Water Board Sir A. C. Houston refers to the use of chlorine in the purification of domestic water supplies. During the twelve months ended March 31, 1924, as much as 24,277 million gallons of Thames river water was dosed to the extent of one part of chlorine to 2·42 million parts of water. This effected a better result than storage in the Staines reservoirs for a month, and, moreover, effected a saving of £14,200. This treatment has now been applied for eight years, during which time 185,000,000,000 gallons of water have been treated, with a gross calculated saving of nearly £120,000. The average dose of one part of chlorine to 2·3 millions of water produced waters from which 78 per cent. of the samples taken showed no *B. coli* in 10 c.c. of water. For the similar treatment of New River water 5,237,000,000 gallons cost £388. Chlorination effected a reduction during the flood months of November, December, and January from 40 per cent. to 14 per cent. of samples containing B. coli. Super-chlorination followed by dechlorination has also been experimented with. Here the super-dose of chlorine is 1 in 500,000. Quick sterilisation is thus effected, with the production of water showing no *B. coli* in 100 c.c., the excess of chlorine then being removed.

From Week to Week

THE UNIVERSITY OF LONDON is to establish a degree of Bachelor of Pharmacy.

WILLIAM GOSSAGE AND SONS, LTD., have appointed Mr. Charles Pierpoint Balmer a director of the company.

THE DEATH OCCURRED on Tuesday at Rawtenstall, of Mr. J. H. Kearns, of the firm of J. and W. Kearns, dyers, Waterfoot, Rossendale.

ITALY'S NATIONAL EXHIBITION of Pure and Applied Chemistry, which was to have been held this autumn, has been postponed until next spring.

MR. LIONEL A. MARTIN retired from the board of Tate and Lyle, Ltd., on September 30. He had been connected with the sugar trade since 1872.

TWELVE CARBOYS OF SULPHURIC ACID were destroyed by fire on the premises of A. J. Dickerson, Ltd., manufacturing chemists, Canal Bank, Trundley's Road, Deptford, on Monday last.

COLONEL W. F. WYLEY, F.C.S., of Wyley's, Ltd., manufacturing chemists, of Coventry, has received the freedom of his city and been presented with his portrait in recognition of public work extending over half a century.

THE CANADA DYE AND CHEMICAL CO. has concluded an agreement with the city of Kingston, Ontario, under which the company will erect a plant in that city and commence the manufacture of dyes, etc., in the near future.

WORKERS EMPLOYED by Willows Francis, Butler and Thompson, wholesale druggists, of Aldersgate Street, London, have just decided in favour of a 48 hour week after working for two years at a minimum of 36, owing to slack trade.

A FOURTH COKE MANUFACTURING PLANT is to be erected in Canada. It will cost more than £200,000, and will be located at St. John, New Brunswick. These coke plants are being built as a result of the successful use of carbon dioxide for refrigerating purposes.

CARBOLIC ACID, inadvertently discharged into the Marne from a factory this week, caused complaints in parts of Paris owing to the peculiar taste of the drinking water. The districts concerned depended for water supplies upon water filtered from the river.

MR. J. R. CAHILL, Commercial Counsellor to H.M. Embassy in Paris, will attend at the D.O.T., 35, Old Queen Street, London, S.W.1, from October 13 to 17, inclusive, for the purpose of interviewing British manufacturers and merchants interested in export trade to France.

CONDITIONS IN THE GERMAN DYESTUFF INDUSTRY are not altogether satisfactory, says the American trade commissioner at Berlin. The manufacture of intermediates as well as dyes has been curtailed somewhat as stocks have accumulated and the outlook for sales in the immediate future is not encouraging.

NEW CHEMICAL WORKS have been erected by the Ford Motor Co., at Iron Mountain, Michigan, U.S.A. The plant has a capacity for handling 210 cords of wood daily, to be manufactured into by-products, and the ultimate output of the plant, it is said, will exceed that of any similar works in existence. Power is furnished from a hydro-electric generating plant.

GAS AND FUEL PLANTS, LTD., 40-43, Norfolk Street, London, W.C.2, announce that the company have recently received orders for complete gasification plants for Kilmalcolm, in Scotland; and Charleville, Levery, Thizy and St. Germain in France. The last two are repeat orders of larger capacity. The company's French agents are the Société Anonyme des Appareils de Manutention et Fours Stein, of 48, Rue la Boëtie, Paris (VIIIe).

MR. W. L. HELM has been appointed managing director of Lever Brothers, as from October 1. Mr. Helm was with Joseph Watson and Sons, soap makers, one of the companies associated with Lever Brothers for some years, and in 1906 joined John Knight, Ltd., of London, of which firm he is vice-chairman. During the war he was secretary of the Soapmakers' Federation initiated by the Ministry of Food and was president of the United Kingdom Soapmakers' Association for the year 1922.

THE EMPLOYEES OF THE UNITED ALKALI CO., LTD., St. Rollox Chemical Works, Glasgow, contributed £87 19s. to local charities during the past year.

PROFESSOR GILBERT MORGAN, of the chemistry department, Birmingham, is to deliver the second Priestley lecture at the Midland Institute, Birmingham, on October 15.

PROFESSOR H. B. DIXON will deliver the first Ludwig Mond lecture at the Chemistry Theatre, Manchester University, on October 20. He will deal with Dr. Mond's life and work.

MR. LAUNCELOT POTTER TIMMINS has been appointed lecturer and demonstrator in oil production to the department of oil mining, and Mr. W. J. Shearer, B.Eng. (Sheffield), lecturer in coal mining at Birmingham University.

MR. J. H. RACE, B.Sc., of Burnley, has been appointed works chemist to the Bishop Auckland Gas Company, out of 92 applicants. An old boy of Burnley Grammar School, he is only 23 years of age, and for three years has been assistant chemist to the Liverpool Gas Company.

MR. E. L. HURST, M.A., Ph.D., assistant lecturer in chemistry at Manchester University, has resigned that post on his appointment as lecturer in chemistry at Armstrong College, Newcastle-on-Tyne. Mr. J. B. M. Herbert, B.Sc., has been appointed assistant lecturer at Manchester.

SYNTHETIC PETROLEUM is claimed to have been produced by a French scientist, who, at the recent meeting of the Synthetic Fuel Congress in Paris, stated that by using vegetable and animal oils as a basis he had made a petroleum which contained all the elements of natural petroleum.

THE AKTIEN GESELLSCHAFT FUR ANILIN FABRIKATION, a member of the German Dye Cartel and one of the companies formerly controlled by Hugo Stinnes, has obtained a loan of $2,500,000 from New York. The loan is for six months only, and will be used to buy raw materials to keep the plant open and working.

A SYNTHETIC AMMONIA PLANT has been founded in Italy under the name of Sarda Ammonia e Prodotti Nitrici with capital of 100,000 lire. It is announced that the company has extended its capital to 10,000,000 lire. The directors include Guido Donegani, of the Montecatini company, Signor Toeplitz, of the Banca Commerciale d'Italia, and Signor Balzarotto, of the Credito Italiano.

MR. E. KILBURN SCOTT, of Vickers and International Combustion Engineering, Ltd., read a paper on "Pulverised Fuel for Large Power Stations" before the Society of Engineers on October 6. He set forth the advantages of pulverised fuel firing, and stated that contracts for the new method of pulverised fuelling have just been fixed with the municipalities of Birmingham, Peterborough, and Derby, the Metropolitan borough of Poplar, and a synthetic nitrates company at Billingham-on-Tees.

ARSENIC POISONING was said to be the complaint from which Richard Kay, of Warrington, was suffering when admitted to Whitecross Institution, where he died. At the inquest on October 3 it was stated that Kay, who was employed by Tomlinson and Hayward, manufacturing chemists, Fidlers Ferry, was responsible for placing powdered arsenic in a mixing pan. After some days his face swelled and broke out in sores. He was discharged as unfit for the work. The inquest was adjourned *sine die* for a chemical examination of certain organs.

DR. J. NEWTON FRIEND, head of the chemistry department of the Birmingham Municipal Technical School, began a series of eight lectures (free to approved students) dealing with recent developments in chemistry, on October 3. The lectures are of an advanced character, a knowledge at least up to the Intermediate B.Sc. standard being assumed. The titles of the addresses during the session are as follows:—"The Spectrum and the Atom"; "Discontinuities and the Quantum Theory"; "The Bohr Atom and the Periodic Classification"; "Theories of Chemical Combination. The Cubical Atom and the Octet Theory. Stark's Theory"; "The Rare Earths and their Industrial Importance"; "Modern Views on Corrosion"; "Applications of the Phase Rule to Natural Phenomena and to Problems of Industrial Importance"; "Carbonyl Compounds. Their Use in Industry and Warfare."

References to Current Literature

British

FILTRATION. Industrial filtration. Part III. S. G. Ure. *J.S.C.I.*, October 3, 1924, pp. 975–983.

ORGANO-TELLURIUM COMPOUNDS. Bactericidal action of tellurium-β-diketones. G. T. Morgan, E. A. Cooper and F. J. Corby. *J.S.C.I.*, October 3, 1924, pp. 304–305T.

ORGANIC SALTS.—Arylamine salts of the naphthalene-sulphonic acids. Part II. The salts of α- and β- naphthalene sulphonic acids. R. B. Forster and C. M. Keyworth. *J.S.C.I.*, October 3, 1924, pp. 299–303T.

ACIDS.—Studies in the configuration of αα′-dibromo-dibasic acids. Part III. The αα′-dibromo-succinic acids. H. R. Ing and W. H. Perkin, jun. *Chem. Soc. Trans.*, September, 1924, pp. 1814–1830.

The chemistry of the glutaconic acids. Part XVI. Three-carbon tautomerism in the cyclo-propane series. Part III. Refractometric evidence. F. R. Goss, C. K. Ingold and J. F. Thorpe. *Chem. Soc. Trans.*, September, 1924, pp. 1927–1930.

HYDROLYSIS.—The hydrolysis of the *p*-toluenesulphonchloro-amides in water. F. G. Soper. *Chem. Soc. Trans.*, September, 1924, pp. 1899–1910.

COMBUSTION.—The ignition of gases. Part III. Ignition by the impulsive electrical discharge. Mixtures of the paraffins with air. R. V. Wheeler. *Chem. Soc. Trans.*, September, 1924, pp. 1858–1867.

The influence of nitrogen dilution on the speed of flame. Part I. C. Campbell and O. C. de C. Ellis. *Chem. Soc. Trans.*, September, 1924, pp. 1957–1960.

VALENCY.—Researches on residual affinity and co-ordination. Part XX. Chromic and cobaltic lakes of mordant azo-dyes. G. T. Morgan and J. D. Main Smith. *Chem. Soc. Trans.*, September, 1924, pp. 1731–1739.

Studies of valency. Part IV. Absorption spectra of camphor, benzylidene-camphor and camphorquinone. Optical evidence of two types of conjugation. T. M. Lowry and H. S. French. *Chem. Soc. Trans.*, September, 1924, pp. 1921–1927.

Researches on residual affinity and co-ordination. Part XXI. Boron β-diketone difluorides. G. T. Morgan and R. B. Tunstall. *Chem. Soc. Trans.*, September, 1924, pp. 1963–1967.

CLAY.—The composition and properties of clay. A. F. Joseph and J. S. Hancock. *Chem. Soc. Trans.*, September, 1924, pp. 1888–1895.

United States

PAPER.—Making paper from wheat straw. C. A. Lovell. *Chem. Met. Eng.*, September 22, 1924, pp. 459–462.

CEMENTS.—How silica cement is made. P. H. Jung. *Chem. Met. Eng.*, September 22, 1924, pp. 465–467.

BRINE.—Conquering natural brines for commerce. C. T. Bragg and W. P. Putnam. *Chem. Met. Eng.*, September 22, 1924, pp. 468–469.

ETHER.—Ether studies. Part II. The quantitative determination of peroxide as a contaminant. A. W. Rowe and E. P. Phelps. *J. Amer. Chem. Soc.*, September, 1924, pp. 2078–2085.

ORGANO ARSENIC COMPOUNDS.—Condensation products of amino-arsanalic acid. W. L. Lewis, P. L. Cramer and R. S. Bly. *J. Amer. Chem. Soc.*, September, 1924, pp. 2058–2065.

ACYLATION.—Steric relations in the acylation of aromatic amines and aminophenols. L. C. Raiford, R. Taft and H. P. Lankelma. *J. Amer. Chem. Soc.*, September, 1924, pp. 2051–2057.

ACIDS.—Studies in the diphenic acid series. Part II. H. W. Underwood and E. L. Kochmann. *J. Amer. Chem. Soc.*, September, 1924, pp. 2069–2078.

DRUGS.—Pressor anæsthetics. Part I. C. S. Marvel and V. du Vigneaud. *J. Amer. Chem. Soc.*, September, 1924, pp. 2093–2099.

FORMATES.—Some new aromatic orthoformates. J. E. Driver. *J. Amer. Chem. Soc.*, September, 1924, pp. 2090–2093.

REACTIONS.—The decomposition of hydrogen iodide. H. A. Taylor. *J. Phys. Chem.*, September, 1924, pp. 984–991.

GELATIN.—The titration curve of gelatin. Part I. W. R. Atkin and G. W. Douglas. *J. Amer. Leather Chem. Assoc.*, September, 1924, pp. 528–541.

ATOMIC STRUCTURE.—Spectroscopy and Bohr's theory of atomic structure. Part I. P. D. Foote. *J. Franklin Inst.*, September, 1924, pp. 344–363.

French

OILS.—The importance of turpentine oil in the perfume industry. Part I. A. Doluis. *Rev. Chim. Ind.*, August, 1924, pp. 213-217.

CHLORINE COMPOUNDS.—Activin, a new form of active chlorine. J. Fritsch. *Rev. Chim. Ind.*, August, 1924, pp. 217-221.

DYEING.—The dyeing of artificial silk (cellulose acetate). Part IV. R. Clavel and T. Stanisz. *Rev. gén. des Matières Colorantes*, August, 1924, pp. 222-224.

VISCOSE.—Contribution to the study of the viscose reaction. B. Rassow and M. Wadewitz. *Rev. gén. des Matières Colorantes*. Part I, August, 1924, pp. 216-219; Part II, September, 1924, pp. 251-254.

COLLOIDS.—Some fundamental principles of my theory of the colloidal state. Part I. P. P. de Weimarn. *Rev. gén. des Colloides*, July, 1924, pp. 193-200.

HYDROGENATION.—Steric hindrance and catalytic hydrogenation. G. Vavon. *Rev. gén. des Sciences*, September 15-30, 1924, pp. 505-517.

German

REACTIONS.—The course of the reaction between phosphorus chlorides and phenol-carboxylic acids. L. Anschütz. *Annalen*, September 20, 1924, pp. 265–275.

The behaviour of the esters of metaphosphoric and phosphorous acids towards hydrazine, hydroxylamine and their derivatives. W. Strecker and H. Heuser. *Ber.*, September 10, 1924, pp. 1364–1372.

KETONES.—Preparation of the higher ketones. B. Helferich and L. Keiner. *Ber.*, September 10, 1924, pp. 1616–1620.

COMPLEX COMPOUNDS.—Complex compounds of lead acetate and propionate and the corresponding alkaline earth metal salts. R. Weinland and E. Baier. *Ber.*, September 10, 1924, pp. 1508–1514.

Inner-complex borates. A. Rosenheim and H. Vermehren. *Ber.*, September 10, 192,4 pp. 1337–1342.

PASSIVITY.—The passivity of metals, particularly iron. W. J. Müller. *Z. Elektrochem.*, September, 1924, pp.401-416.

INDICATORS.—Contribution to the theory of indicators. A. Grünberg. *Z. anorg. u. allg. Chem.*, September 23, 1924, pp. 333-348.

REACTIONS.—The rôle of water in reactions between solid substances. Part III. D. Balarew. *Z. anorg. u. allg. Chem.*, September 23, 1924, pp. 349-356.

The equilibria for the reactions between arsenious acid and bromine and between arsenic acid and hydrobromic acid. W. Manchot and F. Oberhauser. *Z. anorg. u. allg. Chem.*, September 23, 1924, pp. 357-367.

AMINO ACIDS.—The configuration of alanine. K. Freudenberg and F. Rhino. *Ber.*, September 10, 1924, pp. 1547-1557.

ELECTRO-CHEMISTRY.—The electromotive behaviour of aluminium. Part I. A. Smits. *Z. Elektrochem.*, September, 1924, pp. 423-435.

CARBAZOLE DERIVATIVES.—Synthesis of 1-amino-carbazole. H. Lindemann and F. Werther. *Ber.*, September 10, 1924, pp. 1316-1318.

Studies of carbazole derivatives. Part I. R. Seka. *Ber.*, September 10, 1924, pp. 1527-1530.

ANALYSIS.—The electrometric estimation of chlorides. E. Müller. *Z. Elektrochem.*, September, 1924, pp. 420-423.

The gravimetric determination of copper. E. Wilke-Dörfurt and U. Rhein. *Z. anal. Chem.*, No. 10, 1924, pp. 380-388.

The volumetric estimation of hydrazine and its derivatives. A. Kurtenacker and H. Kubina. *Z. anal. Chem.*, No. 10, 1924, pp. 388-392.

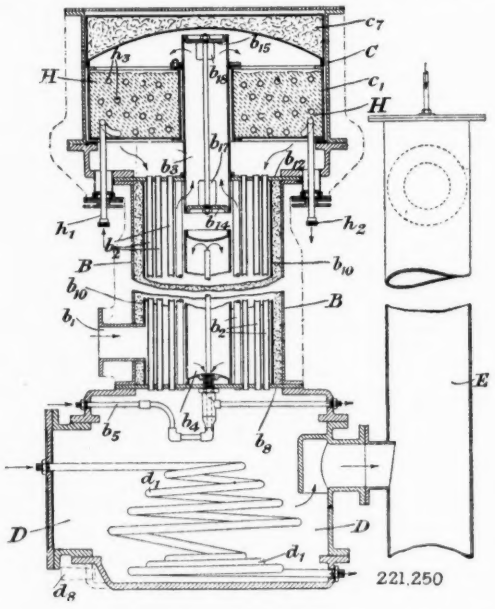
The estimation of benzene in lighting gas by means of active charcoal. W. Gollmer. *Z. angew. Chem.*, October 2, 1924, pp. 773-775.

Patent Literature

Abstracts of Complete Specifications

221,250. Gas Purification, Process and Apparatus for. W. C. Holmes and Co., Ltd., Whitestone Ironworks, and Turnbridge Foundry, Huddersfield, and K. Cox, 311, Upper Richmond Road, Putney, London, S.W. Application date, May 9, 1923.

This apparatus is for purifying gas by the process described in Specification No. 185,780 (see The Chemical Age, Vol. VII, p. 568). The reaction material for purifying the gas and the



heating coils embedded in it are contained in a detachable receptacle which is mounted above a heat exchanger, and the latter above a condenser, the whole being arranged to form a single structure. The heat exchanger B is provided with an inner casing b^{10}, the intervening space being filled with non-conducting material. The heat exchanging tubes b^2 are secured in upper and lower plates b^{12}, b^8. The reaction chamber C is provided with a dome-shaped reflecting surface having a backing c^7 of non-conducting material. A central free space in the heat exchanger B and reaction chamber C is occupied by a cylinder b^3, closed by end plates b^{14}, b^{15}, and having ports b^{17}, b^{18}. The detachable receptacle c^1 fits over the tube b^3 and is provided with gastight joints. The incoming gas enters at b^1, flows around the tubes b^2, through ports b^{17}, b^{18}, and is then deflected downwards through the bed of reaction material H. The heating coil h^3 is provided with inlet and outlet pipes h^1, h^2, so that on breaking these connections the receptacle c^1 may be removed and replaced by another. The lower part of the heat interchanger B contains a closed cylinder b^4 into which steam may be injected by the pipe b^5 for heating purposes. The condenser D is provided with a cooling coil d^1, which may be supplied with steam or water. The gas finally passes into a cooling tower E.

The gas to be treated passes first through a preheater having heating tubes to which steam is supplied through a thermostatic control valve. The gas after passing downwards through the reaction material H passes through the tubes b^2, and thus heats the incoming gas which passes around these tubes. The sulphur contained in the gases is condensed in the chamber D by means of the coil d^1, and may be drawn off at d^8. If the gas has a high content of sulphuretted hydrogen, it is found advantageous to use oil as the attemperating medium in the tubes h^3. The oil circulates in a closed system including a heating coil and a pump. The oil is heated by a gas burner, the gas supply to which is controlled by a thermostatic valve. The cooling tower E and condenser D are filled with firebrick, through which the molten sulphur drains.

221,256. Concentrated Acetic Acid, Manufacture of. E. C. R. Marks, London. From the Grasselli Chemical Co., 1300, Guardian Building, Cleveland, Ohio, U.S.A. Application date, May 30, 1923.

In the usual process for obtaining acetic acid by distilling calcium acetate and hydrochloric acid of 22° Bé., the product is usually only of 30 per cent. concentration. If a higher concentration is obtained by using dry hydrochloric acid gas, the yield and purity are unsatisfactory. In this invention the reaction mixture is distilled in at least two stages, and the strong acetic acid solution produced in the first stage is set aside as the final product, while the dilute acid obtained in the later stages is used for preparing another reaction mixture. The use of the dilute acetic acid instead of water in preparing the reaction mixture also increases the concentration of the product. In preparing the reaction mixture it is preferred to add the hydrochloric acid in stages, so that at first there is a deficiency of acid, and the distillation of hydrochloric acid along with the acetic acid is thereby minimised. The first stage of the distillation is effected by indirect steam heating, but to complete the recovery of acetic acid steam is blown through the mixture. The distillate is scrubbed with calcium acetate solution containing strong acetic acid, so that the calcium acetate reacts with any hydrochloric acid in the distillate. This solution is maintained at boiling point to prevent condensation of acetic acid.

The process may be carried out at atmospheric or reduced pressure, but it is found that the contamination by hydrochloric acid is reduced if the distillation is effected under reduced pressure. In carrying out the process the calcium acetate may be dissolved in aqueous hydrochloric acid, or in weak acetic acid which is afterwards treated with hydrochloric acid gas. This mixture is placed in a steam jacketed iron still with sufficient paraffin wax to form a surface film to prevent foaming. The pressure is preferably 120 mm. of mercury, and the temperature about 90° C. A paraffin wax film is also provided in the scrubber. By this process about 80 per cent. of the acetic acid is obtained in a solution of 50 to 60 per cent. strength and of high purity.

221,359. Dyeings on Fibre, Manufacture of. J. Y. Johnson, London. From Badische Anilin und Soda Fabrik, Ludwigshafen-on-Rhine, Germany. Application date, September 27, 1923.

Dyeings on cotton are obtained by causing diazo compounds to react in a neutral or alkaline solution on bis-(2′-hydroxy-3′-naphthoyl-)arylene diamines. The arylides have a good affinity for the fibre, and it is possible to produce effects with a number of aromatic amines which cannot be employed in the form of their acid diazo solutions. These arylides derived from aromatic diamines can be directly developed with neutral or alkaline solutions of diazo compounds without losses or pollution of the diazo bath. Examples are given.

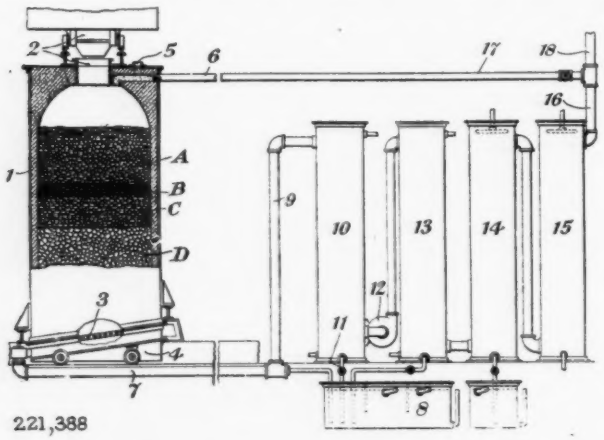
221,380. Emulsions or Solutions of Tar or the like, Manufacture of. L. W. Low, 309, Brunswick Road, Poplar, London, E.14. Application date, November 7, 1923.

Tar pitch or bitumen is mixed with tar oils insufficient in quantity to make a solution. A mixture of casein, resin, caustic soda, and water is heated until saponification is complete, the caustic soda being added in two stages. The mixture is cooled and crude naphtha and phenol are then added. The mixture of tar and pitch is very slowly stirred into the casein solution and heated to boiling point. The emulsion thus obtained will remain in suspension indefinitely, and may be mixed with water in any proportion. The crude naphtha used should contain 8 to 10 per cent. of naphthalene.

221,388. Carbonising, Process of. S. G.S. Dicker, London. From S. E. Co., 1095, Monadnock Buildings, San Francisco, Cal., U.S.A. Application date, November 22, 1923.

The process is for carbonising coal, shale, lignite, etc., at low temperature, and consists in setting up a zone of gaseous combustion above a column of the material, and maintaining a zone of carbonisation in the material, which zone moves slowly downwards. The combustible gases which form the combustion zone are obtained from the carbonising operation,

and they are burned with insufficient air, so that the burnt gases which move downwards with the material have a reducing character. The carbonisation is at a temperature of about 800° Fahr., and the temperature decreases downwards. In low temperature distillation it is usually difficult to secure uniform heating of the material and a uniform temperature, particularly if the reaction is exothermic, and the consumption of heating fuel is also excessive. In this invention the temperature is controlled by means of moisture in the fuel, so that the main body of the fuel below the carbonisation zone cannot be above 212° Fahr. The temperature may be con-



221,388

trolled by regulating the quantity of gas in the down draught. The zone immediately below the carbonisation zone cools the distillation products, and the fuel is preheated. Oil shale may contain 8 to 12 per cent. of water, but if sufficient is not present it may be added. The gas drawn off at the bottom of the retort is a mixture of distillation gas with producer gas, and is saturated with water vapour. The oil and water are removed by scrubbing, and uncondensed vapour may be extracted by oil scrubbing.

The material is charged into a generator 1 having a grate 3 and oil receptable 4. Gas is admitted at 6 and air at 5. The gases and liquid pass through a pipe 7 to a separator 8, from which the oil and water may pass to other apparatus for distillation and ammonia recovery. The gas passes to a water cooled condenser 10 to complete the separation of oil and water, and then to a pan 12 and water cooled condenser 13. Ammonia may be recovered in a scrubber 14, and the gas finally passes through an oil scrubber 15 to a storage reservoir, part being returned through the pipe 17 to the generator. The zone of coke is indicated at A, the carbonising zone at B, the drying and preheating zone at C, and the cooled moist material at D. When the carbonisation zone reaches the bottom the operation is complete and the coke or residue is withdrawn. Steam may also be introduced into the generator to increase the yield of ammonia.

221,418. Indigoid Dyestuffs, Manufacture of. O. Y. Imray, London. From Soc. of Chemical Industry in Basle, Switzerland. Application date, June 8, 1923. Addition to 214,864.

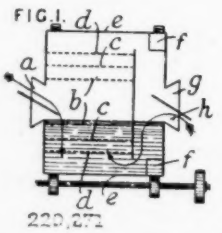
Specification No. 214,864 (see The Chemical Age, Vol. X, p. 578) describes the manufacture of indigoid dyestuffs by condensing a thionaphthisatin with a compound containing a cyclic methylene group capable of reacting. In this invention, an α-anil or an α-halide of 1 : 2-thionaphthisatin or of a nuclear halogen substitution product of a 1 : 2-, 2 : 1-, or 2 : 3-thionaphthisatin is condensed with the above defined compound. The α-anils and α-halides of the thionaphthisatins are obtained from the corresponding naphthothio-indoxyls by the process described for 2 : 1-naphtho-thiondoxyl in Specification No. 210,465 (see The Chemical Age, Vol. X, p. 390). In an example, para[1]-dimethylamino-1 : 1-thionaphthisatin anil is condensed with α-oxy-anthracene and acetic anhydride yielding a brownish black powder giving a green solution in sulphuric acid and dyeing cotton in a yellow-brown vat violet-red shades. Other examples are given of the condensation of the α-(4[1]-dimethylamino)-anil of 1-chloro-2 : 3 thionaphthisatin and acenaphthenone. The properties of these dyestuffs may be improved by halogenation, or if they contain an amino group, by acidylation.

International Specifications not yet Accepted

220,271. Purifying Salt. M. Kruger and S. R. Unkel, 110, Amalia van Solmsstraat, The Hague, Holland. International Convention date, August 6, 1923.

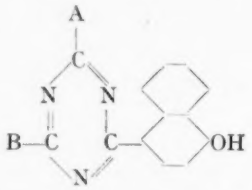
Crude salt is washed with water, or with brine, dilute or saturated. The partly purified salt is washed with fresh liquor, and the used liquor is filtered and used for washing the crude salt. A rotary drum *e* contains conical perforated drums, *b*, *c*, *d* through which the salt passes in succession. The salt is supplied at *a* and the washing liquor at *h*, so that they pass through in counter-current. The washed salt is finally lifted by scoops *f* and discharged at *g*.

FIG. 1.



220,302. Dye Intermediates. Soc. of Chemical Industry in Basle, Switzerland. International Convention date, August 9, 1923.

α-naphthol is treated with a cyanuric halide having at least one replaceable halogen atom in presence of a condensing agent such as aluminium chloride and also carbon bisulphide, petroleum ether, tetrachlorethane or nitrobenzene, to obtain *p*-oxynaphthyl-1 : 3 : 5-triazine derivatives having the general formula :—



where A and B are either further α-naphthol residues or any inorganic, aliphatic, or aromatic residues. In an example, molten α-naphthol is treated with a mixture of cyanuric chloride and aluminium chloride. The product is boiled with hydrochloric acid, forming an addition product and it dissolves in caustic soda, to which solution acetic acid or sodium bisulphite may be added to precipitate the 2 : 4 : 6-tri-*p*-oxynaphthyl-1 : 3 : 5-triazine, free from hydrochloric acid. Other examples are given of the preparation of 2-phenylamino-4 : 6-di-*p*-oxynaphthyl-1 : 3 : 5-triazine, 2 : 4-diamino-6-*p*-oxynaphthyl-1 : 3 : 5-triazine, and 2 : 4-diphenylamino-6-*p*-oxynaphthyl-1 : 3 : 5-triazine.

220,303. Dyes. Society of Chemical Industry in Basle, Switzerland. International Convention date, August 11, 1923.

Dyes suitable for dyeing cellulose acetate are obtained by coupling non-sulphonated nitrodiazo compounds with monosulphonic acids of N-aryl-, N-alkylaryl-, N-aralkyl-, or N-alkylaralkyl-derivatives of aniline or substitution products, except N-alkylaralkyl-derivatives of metanilic acid. In an example, 2 : 4-dinitraniline is diazotized with nitrosyl sulphuric acid, poured on ice, and coupled with sodium ethylbenzyl-aniline sulphonate. Other examples are given of the coupling of diazotized 2 : 6-dichloro-4-nitraniline with sodium diphenyl-amine sulphonate, and diazotized 2-nitraniline-4-sulphonic acid with diphanylamine.

220,304. Dyes. Farbwerke vorm. Meister, Lucius and Brüning, Hoechst-on-Main, Germany. International Convention date, August 8, 1923. Addition to 205,502.

3-aroyl-*peri*-benzanthrones are obtained from the corresponding 3-nitro compound, by reducing, replacing NH_2 by CN, hydrolysing to the carboxylic acid, and condensing the

chloride of the acid with an aromatic hydrocarbon in presence of aluminium chloride. These compounds are then condensed by means of aluminium chloride—*e.g.*, by heating to 180° C. for two days, to obtain the dibenzo-pyrenequinones described in Specification 205,502 (see THE CHEMICAL AGE, Vol. IX, p. 693).

LATEST NOTIFICATIONS.

222,461. Apparatus for the synthetic production of ammonia from the elements. Norsk Hydro-Elektrisk Kvaelstofaktieselskabet. September 28, 1923.

222,486. Process for the manufacture of pure zinconium. Deutsche Gasgluhlicht-Auer-Ges. September 25, 1923.

222,514. Process of producing lactic acid from sugar-containing raw materials by means of micro-organisms. Pollak, A. September 29, 1923.

Specifications Accepted, with Date of Application

195,055. Treating oils, waxes and the like to remove or recover substances therefrom. Silica Gel Corporation. March 16, 1922.

200,090. Sintering ores, Method of and apparatus for. Allmanna Ingeniorsbyran H. G. Torulf. July 3, 1922.

201,898. Indiarubber, and the like. Processes for halogenating the dry or substantially dry latices of—and composition and articles made therefrom. Naugatuck Chemical Co. August 3, 1922.

221,843. Azodyestuffs, Manufacture of intermediate products for making. O. Y. Imray. (*Soc. of Chemical Industry in Basle.*) May 17, 1923.

221,848. Ores, Process and apparatus for the reduction of. E. C. R Marks. (*Cobb Electro Reduction Corporation of Canada, Ltd.*) June 11, 1923.

213,214. Hard alloys, Manufacture of. General Electric Co., Ltd. March 21, 1923.

211,831. Sulphur, Burning of. Texas Gulf Sulphur Co. February 21, 1923. Addition to 202,283.

221,956. Synthetic ammonia, Apparatus for the catalytic production of. L. Casale. September 20, 1923.

221,975. Dyestuffs for wool of the safranine series, Manufacture of. A. G. Bloxam. (*Akt.-Ges. fur Anilin Fabrikation.*) October 23, 1923.

221,976. *o-o*-diacyl derivatives of diphenoisatine and its products of substitution in the phenol and isatine group, Process for the manufacture of. A. Home-Morton. (*F. Hoffman la-Roche & Co. Akt.-Ges.*) October 25, 1923.

222,001. Dyeing of cellulose acetate products. Silver Springs Bleaching and Dyeing Co., Ltd., and A. J. Hall. November 27, 1923.

222,031. Yellow colouring matter of the pyrazolone series. L. B. Holliday and Co., Ltd., A. Clayton and J. A. Stokes. February 13, 1924.

222,033. Internally heated fuel distillation shafts. A. L. Mond. (*Metallbank und Metallurgische Ges, Akt.-Ges.*) February 22, 1924.

221,999. Pure anthracene and pure carbazol, Manufacture of. L. Weil, and Chemische Fabrik in Billwarder vorm. Hell and Sthamer Akt.-Ges. November 20, 1923. Addition to 172,966.

Applications for Patents

Bonnal, L. Spraying-nozzles, etc. 23,384. October 3.

Brown, P. A. Retorts for dry distillation of oils, tars, etc. 23,358. October 3.

Bruni, G. Vulcanisation of rubber. 23,423. October 3. (Italy, February 15.)

Cederberg, I. W. Manufacture of nitric acid. 23,211. October 1.

Duffield, F. L. Reducing iron ore, etc., from pyrites to metal, etc. 23,407. October 3.

Girouard, Sir E. P. C. Manufacture of Portland cement. 22,945. September 29.

Goltstein, E. Treatment of hydrocarbons. 23,104. September 30.

Hereward, H. W., Scottish Dyes, Ltd., and Thomas, J. Production of dyestuffs, etc. 23,207. October 1.

Heyl, G. E. Distillation of oil shale, coal, etc. 22,910. September 29.

Heyl, G. E. Utilisation of oil shale. 22,911 September 29.

Hooton, A. J. S., and Johnson and Co., Ltd., S. H. Filters. 23,128. September 30.

Lever Bros., Ltd. Centrifugal separation of liquids, etc. 23,081. September 30.

Nicklin, M. E. Manufacture of ammonium suplhate and other salts. 23,161. October 1.

Pollak, A. Production of lactic acid from sugar-containing materials. 22,952. September 29. (Czecho-Slovakia, September 29, 1923.)

Riedel Akt.-Ges., J. D. Manufacture of barbituric acid derivatives. 23,112. September 30. (Germany, October 10, 1923.)

Riedel Akt.-Ges., J. D. Manufacture of barbituric acid derivatives. 23,234. October 1. (Germany, June 28.)

Schwalbe, C. G. Treatment of suphite cellulose waste liquor. 23,227. October 1. (Germany, November 6, 1923.)

Soc. d'Etudes Minières et Industrielles. Manufacture of nitrogen peroxide. 23,501. October 4. (France, September 18.)

Stephen, H. Manufacture of aldehydes and intermediate products. 23,136. October 1.

Winser, C. B. Retorts for dry distillation of oils, tars, etc. 23,358. October 3.

Report of the Government Chemist

Increased Number of Samples Examined

THE reports of the work of the Government Laboratories for the year ended March 31, 1924, has just been published by the Stationery Office (pp. 36, price 1s. 6d.). As is well known, the chemical analysis work of the various Departments is performed wholly or in part in the Government Laboratories. The work for most of them is carried out at the Laboratory at Clement's Inn Passage. The laboratory at the Custom House, London, deals especially with Customs samples, while the chemical stations, to which reference is made in connection with the work for the Board of Customs and Excise, deal with Customs samples and some Excise samples. In addition, the Department maintains the laboratory in the Geological Survey Museum for the analysis of ores for the Survey, and carries out the inspection of food stores and supplies for the War Office at the Supply Reserve Depot, Deptford, where also there is a laboratory.

The total number of samples examined in the course of the year, including those dealt with at the chemical stations, is 390,421, as compared with 343,453 in the preceding year, an increase of 46,968. There has been an increase of more than 21,000 in the number of samples examined at the chemical stations, while the number examined at the central laboratories in London has risen from 225,073 to 251,009, an increase of 25,936. Increases in the samples of beers, wines and tobacco are due to the establishment of the Irish Free State and the necessary examination of goods passing to and from that country. The work in connection with the Safeguarding of Industries Act has involved the examination of 7,927 samples. The Dangerous Drugs Act and the Dyestuffs (Import Regulation) Act continue to impose considerable work on the Department.

The report deals in detail with the numbers of various samples of food, fertilisers, wines, beers, tobacco, etc., examined with the number which failed to come up to the required standard (usually a very small proportion). In order to avoid delay in the examination of samples, chemical stations have been established at the more important seaports and one inland town, where samples are tested by Customs and Excise officers who have been specially trained at the Government Laboratory for this purpose.

Under the Safeguarding of Industries Act substances are examined, it is explained in the report, to determine (*a*) whether the chemical is such as to come within the class of those liable to tax; or (*b*) whether, in the case of substances bearing trade names without indication as to their ingredients, such as medicinal preparations, toilet articles and perfumes, the imported article contains any substances liable to tax, and if so in what proportion. The analysis of many of the samples is of an intricate nature, especially as in some cases no information is available as to the composition of the goods. The arrangements made by the Commissioners of Customs and Excise for rating many of the goods have materially reduced the number of samples submitted, leaving still the examination of the more difficult or contentious questions.

Dyestuff Licences in September

THE following statement relating to applications for licences under the Dyestuffs (Import Regulation) Act, 1920, made during September has been furnished to the Board of Trade by the Dyestuffs Advisory Licensing Committee :—

The total number of applications received during the month was 449, of which 361 were from merchants or importers. To these should be added 12 cases outstanding on September 1, making a total for the month of 461. These were dealt with as follows :—Granted, 326 (of which 289 were dealt with within 7 days of receipt); referred to British makers of similar products, 79 (of which 65 were dealt with within 7 days of receipt); referred to reparation supplies available, 31 (all dealt with within two days of receipt); outstanding on September 30, 1924, 25. Of the total of 461 applications received, 385 or 84 per cent. were dealt with within 7 days of receipt.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing those firms' independent and impartial opinions.

London, October 9, 1924.

THERE has been a satisfactory expansion in the volume of business during the past week, and more confidence is being shown by consumers in covering their requirements than has been the case for some time. Prices remain firm with one or two articles showing a tendency to advance.

Export inquiry is improving, and a fair amount of business has been put through on this account.

General Chemicals

ACETONE.—Unchanged with price remaining steady at £93 to £95 per ton.

ACID ACETIC.—In moderate demand, with technical unchanged at £44 and pure at £45.

ACID CITRIC is dull, price easy at 1s. 3d. per lb.

ACID FORMIC.—In improved demand. Price steady at £53 per ton for 85%.

ACID LACTIC.—Better inquiry has been received and price is firm.

ACID OXALIC.—A fair amount of business has been booked both for prompt and forward delivery and price is steady.

ACID TARTARIC.—Remains dull with offers on the market down to 11¼d. per lb.

ALUMINA SULPHATE continues in buyers' favour, and price easy for 17/18% at £7 5s. to £7 10s.

ARSENIC still remains neglected. Price easy at £43 to £44 per ton free on rails.

BARIUM CHLORIDE in steady demand. Price unchanged at £12 15s. per ton.

COPPER SULPHATE unchanged at about £23 per ton.

CREAM OF TARTAR in fair request, with no change in price recorded.

FORMALDEHYDE.—Good inquiries have been received, and price shows no change at £51 to £52 per ton.

EPSOM SALTS firmer with supplies of Continental material scarce.

LEAD ACETATE in steady demand. White quality at £45 to £46, brown at £43.

LEAD NITRATE.—Slightly firmer at £43 to £43 10s.

LIME ACETATE is somewhat firmer at £16 to £16 10s.

MAGNESIUM CHLORIDE.—Continental makers have advanced their prices considerably.

METHYL ALCOHOL.—Unchanged at £60 per ton.

POTASSIUM CAUSTIC.—Firmer and higher prices are asked from the Continent.

POTASSIUM PERMANGANATE.—The Continental price has advanced, and it is expected the price here will respond. Price 7¾d. per lb.

POTASSIUM PRUSSIATE has been in large demand, and price is higher at 7¾d. to 8d. per lb.

SODIUM ACETATE is slower with price unchanged at £22 10s. per ton.

SODIUM HYPOSULPHITE.—Commercial quality unchanged at £9 10s. per ton, and British makers are experiencing a fair demand.

SODIUM NITRITE.—Slightly easier at £25 per ton, but demand fair.

SODIUM PRUSSIATE.—Continues in quietly steady demand, with no price change at 4½d. per lb.

SODIUM SULPHITE.—Unchanged.

Coal Tar Products

90% BENZOL.—Is rather weaker and worth about 1s. 4d. per gallon on rails.

PURE BENZOL is also weaker, being worth 1s. 7d. to 1s. 8d. per gallon on rails.

CREOSOTE OIL appears steady at from 5¼d. to 5½d. per gallon on rails in the North, and 6d. to 6¼d. per gallon on rails in London.

CRESYLIC ACID is steady at 1s. 11½d. to 2s. per gallon on rails for the Pale 97/99% quality, and 1s. 7d. to 1s. 8½d. per gallon for the Dark 95/97% quality.

SOLVENT NAPHTHA remains firm at 11d. to 1s. per gallon, on rails.

HEAVY NAPHTHA is indicated at 10d. to 11d. per gallon on, rails.

NAPHTHALENES.—There is no change to report, supplies being fairly plentiful. Low grades are quoted at from £3 5s. to £4 per ton on rails, while 74/76° is quoted at £5 10s. to £6 10s. per ton, and the 76/78° at £7 to £7 10s. per ton.

PITCH.—Remains quiet, and prices are steady. To-day's values are 40s. to 45s. f.o.b. London; 40s. to 42s. 6d. f.o.b. East Coast; 37s. 6d. to 40s. per ton, f.o.b. West Coast.

SULPHATE OF AMMONIA is in better demand and prices are well maintained.

Nitrogen Products Market

THE prices of sulphate of ammonia for export to the colonies are £13 15s. per ton, f.o.b. for prompt shipment, and £14 to £14 10s. per ton for forward. There is no change to report in the home agricultural position.

With regard to nitrate of soda the market has continued to show a firm tendency, and there has been considerable activity. Prompt c.i.f. values are from £11 13s. to £11 17s. 6d. per ton, and from £12 to £12 5s. per ton November/February shipment.

The total sales for shipment after July 1, 1924, amount to 1,690,000 tons.

American Market Movements

(From "Drug and Chemical Markets.")

INDUSTRIAL chemicals have been moving in better volume and a better feeling exists in the trade. Prices are inclined to be firmer in the majority of products. Imported barium chloride is firmer. Caustic potash is strong. Prussiates are unsettled. Demand for dyes has been quiet owing to quiet textile conditions and expectations of price adjustments when the lower tariff goes into effect. Intermediates are in fair demand. Benzol tendency upward owing to supply and demand. Linseed oil is easier with lower prices for spot oil. Chinawood oil continues strong owing to war activities in China. Soap making oils have been in excellent demand. Turpentine is easier after the recent rise in price. Rosins are firm.

Fine chemicals are in active demand. Imported bromides are higher and little is offered for shipment. Cod liver oil is steady. Strychnine and quinine are active. Formaldehyde is higher. Essential oils show strength in a number of items. Oil peppermint is firm and active. Oil cassia is becoming scarcer. Oil wormseed is higher. Oil cedar wood, spearmint, lemon, and lavender are firm. Crude drugs present little change. Cascara sagrada is firmer on the Coast, and best price now is 12c. lb. f.a.s. Dandelion root is cheaper for shipment. Imports of caraway seed continue heavy.

Power Alcohol from Sugar Beet

THE British Empire Producers' Organisation states that it is understood that some of the principal large users of motor spirit are pressing for favourable terms on sugar beets grown for the purpose of producing power alcohol on the lines of the privileges accorded to those used in the manufacture of sugar. As many overseas members of the British Empire Producers' Organisation are closely concerned with the production of power alcohol, the question of the possibility of development in this country has been under discussion for a considerable period, and the whole position will be reviewed by a special committee recently appointed.

Dissolution of Parliament Decided On

As we go to press it is announced that a dissolution of Parliament has been decided on and that a general election will be held before the end of the month.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at sellers' works.

General Heavy Chemicals

Acid Acetic 40% Tech.—£23 10s. per ton.

Acid Boric, Commercial.—Crystal, £45 per ton. Powder, £47 per ton

Acid Hydrochloric.—3s. 9d. to 6s. per carboy d/d., according to purity, strength and locality.

Acid Nitric 80° Tw.—£21 10s. to £27 per ton, makers' works according to district and quality.

Acid Sulphuric.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations: 140° Tw., Crude Acid, 65s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

Ammonia Alkali.—£6 15s. per ton f.o.r. Special terms for contracts.

Bleaching Powder.—Spot, £11 d/d.; Contract, £10 d/d. 4 ton lots.

Bisulphite of Lime.—£7 per ton, packages extra.

Borax, Commercial.—Crystal, £25 per ton. Powder, £26 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)

Calcium Chloride.—£5 17s. 6d. per ton d/d.

Copper Sulphate.—£25 per ton.

Methylated Spirit 64 O.P.—Industrial, 2s. 7d. to 2s. 11d. per gall. Mineralised, 3s. 8d. to 4s. per gall., in each case according to quantity.

Nickel Sulphate.—£38 per ton d/d. Normal business.

Nickel Ammonia Sulphate.—£38 per ton d/d. Normal business.

Potash Caustic.—£30 to £33 per ton.

Potassium Bichromate.—5½d. per lb.

Potassium Chlorate.—3d. to 4d. per lb.

Salammoniac.—£32 per ton d/d.

Salt Cake.—£3 10s. per ton d/d.

Soda Caustic, Solid.—Spot lots delivered, £16 7s. 6d. to £19 7s. 6d. per ton, according to strength; 20s. less for contracts.

Soda Crystals.—£5 5s. to £5 10s. per ton ex railway depots or ports.

Sodium Acetate 97/98%.—£24 per ton.

Sodium Bicarbonate.—£10 10s. per ton carr. paid.

Sodium Bichromate.—4½d. per lb.

Sodium Bisulphite Powder 60/62%.—£17 to £18 per ton, according to quantity, f.o.b., 1-cwt. iron drums included.

Sodium Chlorate.—3d. per lb.

Sodium Nitrate refined 96%.—£13 5s. to £13 10s. per ton, ex Liverpool. Nominal.

Sodium Nitrite 100% basis.—£27 per ton d/d.

Sodium Sulphide conc. 60/65.—About £14 10s. per ton d/d.

Sodium Sulphide Crystals.—£9 per ton d/d.

Sodium Sulphite, Pea Crystals.—£15 per ton f.o.r. London, 1-cwt. kegs included.

Coal Tar Products

Acid Carbolic Crystals.—6½d. per lb. Quiet. Crude 60's, 1s. 7d. to 1s. 9d. per gall. according to district. Market flat.

Acid Cresylic 97/99.—2s. to 2s. 1d. per gall. Demand fair. Pale 95%, 1s. 9d. to 2s. 1d. per gall. Better inquiry. Dark, 1s. 9d. to 2s. 1d. per gall. Quiet.

Anthracene Paste 40%.—4d. per unit per cwt. Nominal price. No business.

Anthracene Oil, Strained.—6d. to 6½d. per gall. Small demand. Unstrained, 7d. to 7½d. per gall.

Benzol.—Crude 65's.—7½d. to 9d. per gall., ex works in tank wagons. Standard Motor, 1s. 1½d. to 1s. 3d. per gall., ex works in tank wagons. Pure, 1s. 5½d. to 1s. 7d. per gall., ex works in tank wagons.

Toluol.—90%, 1s. 5d. to 1s. 5½d. per gall. Pure, 1s. 8d. to 1s. 9d. per gall. Small demand.

Xylol Commercial.—2s. 3d. per gall. Pure, 3s. 3d. per gall.

Creosote.—Cresylic, 20/24%, 8½d. per gall. Little demand. Middle Oil, Heavy, Standard specification, 5½d. to 6d. per gall., according to quality and district. Small demand from America.

Naphtha.—Crude, 8d. to 9d. per gall. Solvent 90/160, 11d. to 1s. 2d. per gall., according to district. A shade firmer. Solvent 90/190, 11d. to 1s. per gall. Not much demand.

Naphthalene Crude.—Demand rather better. Cheaper in Yorkshire than in Lancashire. Drained Creosote Salts, £4 to £6 per ton. Quiet. Whizzed or hot pressed, £6 to £9 per ton.

Naphthalene.—Crystals and Flaked, £12 to £16 per ton, according to district.

Pitch.—Medium soft, 40s. to 45s. per ton, f.a.s. Market very flat. No business.

Pyridine.—90/160, 18s. 6d. to 19s. per gall. Steady demand. Heavy, 12s. Little business.

Intermediates and Dyes

Business in dyestuffs has been better since the beginning of the month and further improvement is expected.

In the following list of Intermediates delivered prices include packages except where otherwise stated.

Acetic Anhydride 95%.—1s. 7d. per lb.

Acid H.—3s. 11d. per lb. 100% basis d/d.

Acid Naphthionic.—2s. 4d. per lb. 100% basis d/d.

Acid Neville and Winther.—5s. 8d. per lb. 100% basis d/d.

Acid Salicylic, technical.—1s. 1d. per lb. Improved demand.

Acid Sulphanilic.—9½d. per lb. 100% basis d/d.

Aluminium Chloride, anhydrous.—1s. per lb. d/d.

Aniline Oil.—8d. per lb. naked at works.

Aniline Salts.—8½d. per lb. naked at works.

Antimony Pentachloride.—1s. per lb. d/d.

Benzidine Base.—4s. per lb. 100% basis d/d.

Benzyl Chloride 95%.—1s. 1d. per lb.

p-Chlorphenol.—4s. 3d. per lb. d/d.

p-Chloraniline.—3s. per lb. 100% basis.

o-Cresol 19/31° C.—4½d. per lb. Rather quiet.

m-Cresol 98/100%.—2s. 1d. to 2s. 3d. per lb. Demand moderate.

p-Cresol 32/34° C.—2s. 1d. to 2s. 3d. per lb. Demand moderate.

Dichloraniline.—2s. 3d. to 3s. per lb.

Dichloraniline S. Acid.—2s. 6d. per lb. 100% basis.

p-Dichlorbenzol.—£85 per ton.

Diethylaniline.—4s. 6d. per lb. d/d., packages extra, returnable.

Dimethyaniline.—2s. 3d. per lb. d/d. Drums extra.

Dinitrobenzene.—9d. to 10d. per lb. naked at works.

Dinitrochlorbenzol.—£84 10s. per ton d/d.

Dinitrotoluene.—48/50° C. 8d. to 9d. per lb. naked at works. 66/68° C. 1s. 2d. per lb. naked at works.

Diphenylaniline.—2s. 10d. per lb. d/d.

Monochlorbenzol.—£63 per ton.

B-Naphthol.—1s. per lb. d/d.

a-Naphthylamine.—1s. 4d. per lb. d/d.

B-Naphthylamine.—4s. per lb. d/d.

m-Nitraniline.—4s. 3d. per lb. d/d.

p-Nitraniline.—2s. 3d. per lb. d/d.

Nitrobenzene.—5½d. to 5¾d. per lb. naked at works.

o-Nitrochlorbenzol.—2s. per lb. 100% basis d/d.

Nitronapthalene.—10½d. per lb. d/d.

p-Nitrophenol.—1s. 9d. per lb. 100 % basis d/d.

p-Nitro-*o*-amido-phenol.—4s. 6d. per lb. 100% basis.

m-Phenylene Diamine.—3s. 11d. per lb. d/d.

p-Phenylene Diamine.—10s. 2d. per lb. 100% basis d/d.

R. Salt.—2s. 5d. per lb. 100% basis d/d.

Sodium Naphthionate.—2s. 3d. per lb. 100% basis d/d.

o-Toluidine.—10d. per lb.

p-Toluidine.—3s. 3d. to 4s. 2d. per lb. naked at works.

m-Toluylene Diamine.—4s. per lb. d/d.

Wood Distillation Products

Acetate of Lime.—Brown £12 per ton d/d. Grey £16 per ton. Market easier. Liquor, 9d. per gall. 32° Tw.

Charcoal.—£7 15s. to £9 5s. per ton, according to grade and locality. Market brisker.

Iron Liquor.—1s. 7d. per gall. 32° Tw. 1s. 2d. per gall. 24° Tw.

Red Liquor.—10d. to 1s. per gall. 14/15° Tw.

Wood Creosote.—2s. 9d. per gall. Unrefined.

Wood Naphtha, Miscible.—4s. 10d. per gall. 60% O.P. Market dull. Solvent, 5s. 3d. per gall. 40% O.P. Fairly good demand.

Wood Tar.—£4 5s. per ton. Cheaper.

Brown Sugar of Lead.—£43 per ton. Cheaper.

Rubber Chemicals

Antimony Sulphide.—Golden, 5½d. to 1s. 4d. per lb., according to quality. Crimson, 1s. 3d. to 1s. 6d. per lb., according to quality.

Arsenic Sulphide, Yellow.—1s. 11d. per lb.

Barytes.—£3 10s. to £6 15s. per ton, according to quality.

Cadmium Sulphide.—3s. 9d. to 4s. per lb., according to quantity.

Carbon Bisulphide.—£30 to £33 per ton, according to quantity. Again dearer.

Carbon Black.—7d. to 7½d. per lb., ex-wharf. Dearer.

Carbon Tetrachloride.—£60 to £65 per ton, according to quantity, drums extra. Again dearer.

Chromium Oxide, Green.—1s. 3d. per lb.

Indiarubber Substitutes, White and Dark.—5d. to 9½d. per lb. Demand very brisk. Prices likely to remain steady owing to firmness of rapeseed oils.

Lamp Black.—£48 per ton, barrels free.

Lead Hyposulphite.—7½d. per lb.

Lithopone, 30%.—£22 10s. per ton.

Mineral Rubber "Rubpron."—£16 5s. per ton f.o.r. London.

Sulphur.—£10 to £12 per ton, according to quality
Sulphur Chloride.—4d. per lb., carboys extra. Dearer.
Thiocarbanilide.—2s. 6d. per lb.
Vermilion, Pale or Deep.—5s. 1d. per lb. Dearer.
Zinc Sulphide.—7½d. to 1s. 8d. per lb., according to quality.

Pharmaceutical and Photographic Chemicals

Acid, Acetic 80% B.P.—£47 per ton. Firmer.
Acid, Acetyl Salicylic.—3s. to 3s. 3d., according to quality.
Acid, Benzoic B.P.—3s. to 3s. 6d. per lb.
Acid, Boric B.P.—Crystal £51 per ton, Powder £55 per ton. Carriage paid any station in Great Britain.
Acid, Camphoric.—19s. to 21s. per lb.
Acid, Citric.—1s. 3½d. to 1s. 4½d. per lb., less 5% for ton lots. Market very weak.
Acid, Gallic.—3s. per lb. for pure crystal.
Acid, Pyrogallic, Crystals.—6s. 9d. per lb. for 1 cwt. lots. Market firm. Increasing demand.
Acid, Salicylic.—1s. 6d. to 1s. 8d. per lb., according to quantity.
Acid, Tannic B.P.—2s. 10d. per lb. Market quiet.
Acid, Tartaric.—1s. 1½d. per lb., less 5%.
Amidol.—9s. per lb. d/d.
Acetanilide.—2s. 1d. to 2s. 3d. per lb. for quantity. Demand slow.
Amidopyrin.—13s. 3d. per lb. Neglected. Stocks low.
Ammonium Benzoate.—3s. 3d. to 3s. 6d. per lb., according to quantity.
Ammonium Carbonate B.P.—£37 per ton.
Atropine Sulphate.—12s. 6d. per oz. for English make.
Barbitone.—15s. to 15s. 6d. per lb. Quiet market.
Benzonaphthol.—5s. 3d. per lb. Small inquiry.
Bismuth Salts.—Prices reduced by about 1s. 3d. to 2s. 3d. per lb. on account of the fall in the price of the metal.
Bismuth Carbonate.—10s. 6d. to 12s. 6d. per lb.
Bismuth Citrate.—10s. 3d. to 12s. 3d. per lb.
Bismuth Salicylate.—9s. 0d. to 11s. 0d. per lb.
Bismuth Subnitrate.—9s. 8d. to 10s. 8d. per lb.
Borax B.P.—Crystal £29, Powder £30 per ton. Carriage paid any station in Great Britain.
Bromides.—Potassium, 1s. 4d. to 1s. 7d. per lb.; sodium, 1s. 5d. to 1s. 8d. per lb.; ammonium, 1s. 6d. to 1s. 9d. per lb. Market firm and Continental prices fully maintained with upward tendency.
Calcium Lactate—1s. 6d. to 1s. 9d., according to quantity. Fair demand and steady market.
Chloral Hydrate.—4s. to 4s. 3d. per lb. Market easier after recent firmness.
Chloroform.—2s. per lb. for cwt. lots. Very steady.
Creosote Carbonate.—6s. 6d. per lb. Little demand.
Formaldehyde.—£49 per ton, ex works. English make in casks. About 8s. per cwt. extra for carboys.
Glycerophosphates.—Fair business passing. Calcium, soluble and citrate free, 7s. per lb.; iron, 8s. 9d. per lb.; magnesium, 9s. per lb.; potassium, 50%, 3s. 6d. per lb.; sodium, 50%, 2s. 6d. per lb.
Guaiacol Carbonate.—10s. 6d. to 11s. 3d. per lb.
Hexamine.—3s. 1d. to 3s 3d. per lb.
Homatropine Hydrobromide.—30s. per oz.
Hydrastine Hydrochloride.—English make offered at 120s. per oz.
Hydroquinone.—4s. 3d. per lb. in cwt. lots. Foreign make.
Hypophosphites.—Calcium, 3s. 6d. per lb. for 28 lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.
Iron Ammonium Citrate B.P.—2s. 1d. to 2s. 5d. per lb., according to quantity.
Magnesium Carbonate.—Light Commercial, £36 per ton net.
Magnesium Oxide.—Light Commercial, £75 per ton, less 2½%; Heavy Commercial, £25 per ton, less 2½%; Heavy Pure, 1s. 6d. to 2s. per lb., according to quantity. Steady market.
Menthol.—A.B.R. recrystallised B.P., 52s. per lb. Cheaper. Synthetic, 26s. to 35s. per lb. Increasing demand.
Mercurials.—Market very quiet. Red oxide, 5s. 3d. to 5s. 4d. per lb.; Corrosive sublimate, 3s. 6d. to 3s. 7d. per lb.; white precipitate, 4s. 7d. to 4s. 8d. per lb.; Calomel, 3s. 11d. to 4s. per lb.
Methyl Salicylate.—1s. 10d. to 2s. per lb.
Methyl Sulphonel.—26s. per lb.
Metol.—11s. per lb. British make.
Morphine and Salts.—Reduced by 1s. to 1s. 3d. per oz.
Paraformaldehyde.—2s. 6½d. for cwt. lots.
Paraldehyde.—1s. 6d. per lb., in free bottles and cases.
Phenacetin.—5s. 9d. per lb.
Phenazone.—7s. 2d.
Phenolphthalein.—5s. 6d. to 6s per lb. in cwt. lots.
Potassium Bitartrate 99/100% (Cream of Tartar).—88s. per cwt. less 2½% for ton lots. Firm market. Prices have upward tendency.
Potassium Citrate.—1s. 10d. to 2s. 2d. per lb. Dearer.
Potassium Iodide.—16s. 8d. to 17s. 5d. per lb., according to quantity. Good steady demand.
Potassium Metabisulphite.—7½d. per lb., 1-cwt. kegs included, f.o.r. London.
Potassium Permanganate.—B.P. crystals, 7½d. per lb., carriage paid; commercial, 8d. to 8½d. per lb., carriage paid. Keen competition keeps prices low.
Quinine Sulphate.—2s. 3d. to 2s. 4d. per oz., in 100 oz. tins. Good market.
Resorcin.—5s. 6d. per lb.
Saccharin.—63s. per lb. in 50-lb. lots.
Salol.—3s. 6d. to 4s. per lb.
Silver Proteinate.—9s. 6d. per lb.
Sodium Benzoate, B.P.—2s. 9d. per lb. Ample supplies B.P. quality available.
Sodium Citrate, B.P.C., 1923.—1s. 11d. to 2s. 2d. per lb., according to quantity.
Sodium Hypophosphite, Photographic.—£13 to £15 per ton, according to quantity, d/d. consignee's station in 1-cwt. kegs.
Sodium Metabisulphite Crystals.—37s. 6d. to 60s. per cwt., net cash, according to quantity.
Sodium Nitroprusside.—16s. per lb. Less for quantity.
Sodium Potassium Tartrate (Rochelle Salt).—75s. to 82s. 6d. per cwt., according to quantity. Market steady, good demand.
Sodium Salicylate.—Powder, 2s. to 2s. 3d. per lb. Crystal, 2s. 2d. to 2s. 5d. per lb. Flake, 2s. 9d. per lb. Fair demand
Sodium Sulphide, pure recrystallised.—10d. to 1s. 2d. per lb., according to quantity.
Sodium Sulphite, anhydrous, £27 10s. to £28 10s. per ton, according to quantity, 1 cwt. kegs included. In large casks £1 per ton less.
Sulphonal.—15s. per lb. Easier.
Thymol.—17s. 6d. per lb. Very scarce indeed.

Perfumery Chemicals

Acetophenone.—12s. 6d. per lb.
Aubepine.—15s. 3d. per lb. Advanced.
Amyl Acetate.—2s. 6d. per lb. Cheaper.
Amyl Butyrate.—6s. 9d. per lb.
Amyl Salicylate.—3s. 3s. per lb. Dearer.
Anethol (M.P. 21/22° C.).—4s. 6d. per lb.
Benzyl Acetate from Chlorine-free Benzyl Alcohol.—2s. 9d per lb.
Benzyl Alcohol free from Chlorine.—2s. 9d. per lb.
Benzaldehyde free from Chlorine.—3s. 6d. per lb.
Benzyl Benzoate.—3s. 6d. per lb.
Cinnamic Aldehyde Natural.—18s. 9d. per lb. Advanced.
Coumarin.—19s. 6d. per lb. Cheaper.
Citronellol.—17s. per lb. Again advanced.
Citral.—8s. per lb. Cheaper.
Ethyl Cinnamate.—12s. 6d. per lb. Cheaper.
Ethyl Phthalate.—3s. 3d. per lb.
Eugenol.—10s. per lb. Cheaper.
Geraniol (Palmarosa).—33s. 6d. per lb. Cheaper.
Geraniol.—11s. to 18s. 6d. per lb.
Heliotropine.—6s. 9d. per lb. Cheaper.
Iso Eugenol.—15s. 9d. per lb.
Linalol ex Bois de Rose.—26s. per lb.
Linalyl Acetate.—26s. per lb.
Methyl Anthranilate.—9s. 6d. per lb.
Methyl Benzoate.—5s. per lb.
Musk Ambrette.—50s. per lb. Dearer.
Musk Xylol.—13s. 6d. per lb. Again cheaper.
Nerolin.—4s. 9d. per lb. Advanced.
Phenyl Ethyl Acetate.—15s. per lb. Advanced.
Phenyl Ethyl Alcohol.—16s. per lb.
Rhodinol.—60s. per lb. Advanced.
Safrol.—1s. 10d. per lb.
Terpineol.—2s. 4d. per lb. Cheaper.
Vanillin.—26s. per lb.

Essential Oils

Almond Oil, Foreign S.P.A.—15s. 6d. per lb.
Anise Oil.—2s. 8d. per lb.
Bergamot Oil.—16s. 6d. per lb. Cheaper.
Bourbon Geranium Oil.—35s. per lb.
Camphor Oil.—65s. per cwt.
Cananga Oil, Java.—10s. per lb. Cheaper.
Cinnamon Oil, Leaf.—6½d. per oz.
Cassia Oil, 80/85%.—9s. 9d. per lb. Cheaper.
Citronella Oil.—Java, 85/90%, 5s. 9d. per lb. Ceylon, 3s. 3d. per lb. Cheaper.
Clove Oil.—7s. 6d. per lb. Cheaper.
Eucalyptus Oil, 70/75%.—2s. 3d. per lb. Cheaper.
Lavender Oil.—French 38/40% Esters, 28s. 6d. per lb. Dearer.
Lemon Oil.—3s. per lb.
Lemongrass Oil.—4s. 6d. per lb.
Orange Oil, Sweet.—11s. per lb.
Otto of Rose Oil.—Bulgarian, 40s. per oz. Dearer. Anatolian, 18s. per oz.
Palma Rosa Oil.—16s. 6d. per lb. Cheaper.
Peppermint Oil.—Wayne County, 30s. per lb. Japanese, 18s. per lb. English, 65s. per lb.
Petitgrain Oil.—9s. 3d. per lb.
Sandal Wood Oil.—Mysore, 26s. 7d. per lb. Australian, 18s. 6d. per lb. Cheaper.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

GLASGOW, *October* 9, 1924.

In the Heavy Chemical Market business continues quiet, and there is no change of any importance to record.

Industrial Chemicals

ACID ACETIC.—Moderate inquiry. Glacial 98/100%, £58 to £69 per ton; 80%, pure, £45 to £46 per ton; 80%, technical, £44 to £45 per ton. All packed in casks delivered c.i.f. U.K. port, duty free.

ACID BORACIC.—Crystal or granulated, £45 per ton; powdered, £47 per ton, carriage paid U.K. stations; minimum ton lots.

ACID CARBOLIC, ICE CRYSTALS.—Nominally 6d. per lb. delivered, but could probably be obtained for less.

ACID CITRIC, B.P. CRYSTALS.—In little demand and price unchanged at 1s. 4d. per lb., less 5% ex store.

ACID FORMIC, 85%.—Cheaper quotations from the continent. Now quoted about £50 per ton c.i.f. U.K. ports, duty free. Spot lots quoted £54 to £55 per ton, ex store.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy ex works.

ACID NITRIC 80°.—£23 10s. per ton ex station, full truck loads.

ACID OXALIC, 98/100%.—In little demand. Quoted 4d. per lb., ex store, spot delivery. Offered for prompt shipment from the continent at about 3¾d. per lb. c.i.f. U.K. port.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—Spot lots unchanged at about 1s. per lb., less 5% ex store. Offered for forward delivery at about the same figure.

ALUMINA SULPHATE, 17/18%.—Iron free quality quoted £7 per ton c.i.f. U.K. port. Spot lots on offer at about £7 17s. 6d. per ton, ex store; 14/15% quality quoted, £6 per ton c.i.f. U.K. port.

ALUM.—Ammonium chrome alum quoted £17 to £19 per ton, according to quality, f.o.b. U.K. port. Lump potash alum available at £9 10s. per ton, ex store, spot delivery. Offered for prompt shipment from the continent at about £8 2s. 6d. per ton c.i.f. U.K. port.

AMMONIA ANHYDROUS.—Unchanged at about 1s. 6d. per lb., ex station. Containers extra and returnable, with possible slight reduction for large quantities.

AMMONIA CARBONATE.—Lump, £37 per ton; powdered, £39 per ton; packed in 5 cwt. casks delivered U.K. port.

AMMONIA LIQUID, 880°.—In steady demand, unchanged at 2½d. to 3d. per lb. delivered, according to quantity. Containers extra.

AMMONIA MURIATE.—Gray galvanisers' crystals of English manufacture unchanged at about £30 per ton ex station. Fine white crystals offered from the continent at £24 per ton c.i.f. U.K. port.

ARSENIC, WHITE POWDERED.—Slightly cheaper quotations for forward delivery. Spot lots still quoted £50 per ton, ex store.

BARIUM CARBONATE.—98/100%, powdered, quoted £9 10s. per ton c.i.f. U.K. port, prompt shipment from the continent.

BARIUM CHLORIDE, 98/100%.—Spot material quoted £14 per ton, ex store. Slightly cheaper quotation from the continent. Crystals quoted £11 15s. per ton c.i.f. U.K. port.

BARYTES.—English material unchanged at £5 15s. per ton, ex works. Continental quoted £5 per ton c.i.f. U.K. port.

BLEACHING POWDER.—Spot lots £11 per ton, ex station. Contracts, 20s. per ton less.

BORAX.—Granulated, £24 10s. per ton; crystals, £25 per ton; powdered, £26 per ton, carriage paid U.K. stations, minimum ton lots.

CALCIUM CHLORIDE.—English material unchanged at £5 12s. 6d. per ton, ex station. Slightly cheaper quotations from the continent. Now offered at about £4 15s. per ton c.i.f. U.K. port.

COPPERAS, GREEN.—Unchanged at about £3 per ton, ex works packed in casks free.

COPPER SULPHATE.—Quoted £24 5s. per ton f.o.b. U.K. port for, export. Continental material available at about £23 per ton, ex quay.

FORMALDEHYDE, 40%.—Continental quotations inclined to be higher, but spot lots still available at about £51 per ton, ex store.

GLAUBER SALTS.—English material quoted £4 per ton ex store or station. Fine white crystals on offer from the continent at £2 17s. 6d. per ton c.i.f. U.K. port; large crystals, 17s. 6d. per ton extra.

LEAD, RED.—Slightly cheaper quotations for imported material. Now quoted £40 per ton, ex store, spot delivery.

LEAD, WHITE.—On offer at about £43 to £43 10s. per ton, ex store, spot delivery.

LEAD, ACETATE.—White crystals offered from the continent at £42 10s. per ton, c.i.f. U.K. port. Brown, £40 per ton c.i.f. U.K. port. White crystals quoted £45 5s. per ton, ex store, spot delivery.

MAGNESITE, CALCINED.—Unchanged at about £7 17s. 6d. per ton ex station, prompt delivery. Hard burnt quality quoted £4 15s. per ton, ex station. Finer quality of continental manufacture quoted £7 15s. per ton c.i.f. U.K. port.

MAGNESIUM CHLORIDE.—Unchanged at about £4 7s. 6d. per ton, c.i.f. U.K. port. Spot material available at about £4 10s. per ton, ex store.

POTASH CAUSTIC, 88/92%.—Spot lots unchanged at about £30 per ton, ex store. On offer from the continent at £28 10s. per ton c.i.f. U.K. port.

POTASSIUM BICHROMATE.—Unchanged at 5½d. per lb. delivered.

POTASSIUM CARBONATE.—96/98% quality, £22 5s. per ton c.i.f. U.K. port. Spot lots available at about £24 15s. per ton, ex store; 90/94% quality, £20 7s. 6d. per ton c.i.f. U.K. port.

POTASSIUM CHLORATE.—Offered for prompt shipment from the continent at about 2¾d. per lb. ex wharf, spot lots quoted 3d. per lb., ex store.

POTASSIUM NITRATE (SALTPETRE).—Quoted £26 per ton c.i.f. U.K. port, prompt shipment from the continent. Spot lots on offer at £28 15s. per ton ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Quoted 6d. per lb., ex wharf, prmpt shipment from the continent. Spot lots available at about 8d. per lb., ex store.

POTASSIUM PRUSSIATE, YELLOW.—In slightly better demand. Spot lots quoted 6¾d. to 7d. per lb., ex store.

SODA CAUSTIC.—76/77%, £19 7s. 6d. per ton; 70/72%, £17 17s. 6d. per ton; 60/62%, broken, £19 2s. 6d. per ton; 98/99%, powdered, £22 15s. per ton. All ex station, spot delivery. Contracts, 20s. per ton less.

SODIUM ACETATE.—On offer from the continent at about £21 10s. per ton c.i.f. U.K. port. Spot lots available at about £22 15s. per ton, ex store.

SODIUM BICARBONATE.—Refined recrystallised quality £10 10s. per ton, ex quay or station; M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—Unchanged at 4¼d. per lb. delivered.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton, ex quay or station; powdered, or pea quality, £1 7s. 6d. per ton more; alkali, 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—English material unchanged at £10 per ton, ex station. Cheaper continental offers now quoted £8 2s. 6d. per ton c.i.f. U.K. port. Spot lots about £9 7s. 6d. per ton, ex store. Pea crystals of English manufacture unchanged at £13 15s. per ton, ex station.

SODIUM NITRATE.—Ordinary quality quoted £13 7s. 6d. per ton, ex store; 96/98%, refined quality, quoted 7s. 6d. per ton extra.

SODIUM NITRITE, 100%.—In little demand. Spot lots on offer at £26 per ton, ex store.

SODIUM PRUSSIATE, YELLOW.—Spots lot unchanged at 4d. per lb., ex store.

SODIUM, SALTCAKE.—Price for home consumption £3 10s. per ton f.o.r. Good inquiry for export and price about £3 per ton.

SODIUM SULPHIDE.—60/65%, solid, of English manufacture, £14 15s. per ton, ex station; broken, £1 per ton more; flake, £2 per ton more; 60/62%, solid, offered from the continent at £12 10s. per ton c.i.f. U.K. port; broken, £1 2s. 6d. per ton extra; 31/34%, crystals, of English manufacture, £9 2s. 6d. per ton, ex station; 30/32%, crystals, offered from the continent at £8 12s. 6d. per ton c.i.f. U.K. port.

SULPHUR.—Flowers, £9 10s. per ton; roll, £8 10s. per ton; rock, £8 7s. 6d. per ton; ground, £8 5s. per ton, ex store, prices nominal.

ZINC CHLORIDE.—98/100%, solid, offered from the continent at about £24 5s. per ton c.i.f. U.K. port; 96/98% quoted £23 10s. per ton c.i.f. U.K. port. English material for export about £26 per ton f.o.b. U.K. port.

ZINC SULPHATE.—Spot lots of continental material available at £11 10s. per ton, ex wharf.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

ALPHA NAPHTHYLAMINE.—Good demand, price 1s. 3½d. to 1s. 4d. per lb.

ANILINE OIL.—Some export inquiry. Price 8¼d. per lb. f.o.b., drums included.

BENZIDINE BASE.—Small home inquiry. Price 4s. per lb. 100% basis.

DIPHENYLAMINE.—Limited home demand. Price 2s. 10d. lb., carriage paid.

META TOLUYLENE DIAMINE SULPHONIC ACID.—Export inquiry. Price 5s. lb. 100% basis.

ORTHO ANISIDINE.—Some export inquiry. Price 11s. 3d. per lb. f.o.b.

PARANITRANILINE.—Demand continues good. Price 2s. 2½d. per lb. delivered.

SULPHANILIC ACID.—Some home inquiry. Price 10d. per lb. 100% basis, carriage paid.

TOLIDINE BASE.—Small home inquiry. Price 7s. lb. 100% basis.

TOBIAS ACID.—Home and export inquiries. Price 4s. 6d. per lb. 100% basis, carriage paid or f.o.b.

The Manchester Chemical Market

[FROM OUR OWN CORRESPONDENT.]

Manchester, October 9, 1924.

THE demand for heavy chemicals continues on quietly steady lines, with business largely confined to the bread-and-butter varieties. Inquiry for some of the textile chemicals has shown a slight expansion, and a satisfactory feature is that some buyers seem disposed to take a little more interest in forward positions. In some sections of the market quotations are easy, although this applies only to a few products. On the export side a small volume of business has been done on Continental account, but the bulk is for shipment to the Colonies, Canada and Australia chiefly.

Heavy Chemicals

The demand for bleaching powder is still only moderate, but values are maintained at £10 per ton. Hyposulphite of soda is a shade easier at about £14 2s. 6d. per ton for photographic crystals and £9 10s. for commercial quality, inquiry being rather restricted. Caustic soda is well held at from £16 17s. 6d. per ton for 60 per cent. strength to £19 7s. 6d. for 76-77 per ton; the demand for home consumers as well as for shipment keeps up to its recent level. Business in sulphide of sodium is not too active, although quotations are fairly steady at £14 10s. per ton for 60-65 per cent. concentrated solid and £9 10s. for crystals. Prussiate of soda is only in small demand and values are easy at 3¾d. per lb. Saltcake shows little improvement generally, although some trade has been done for export; prices are still on the basis of £3 10s. per ton. Glauber salts are also quiet at about the same figure. Alkali meets with a fairly steady demand for both branches of trade at round £6 15s. per ton. Acetate of soda is moderately active and values are unchanged at from £22 to £23 per ton. Phosphate of soda is quiet and slightly easier at £13 to £13 10s. per ton. Chlorate of soda meets with a quietly steady inquiry at 2⅝d. per lb. Bichromate of soda is steady and in moderate request at 4¼d. per lb. Bicarbonate of soda has attracted only comparatively small attention, although values are unchanged from the recent level of £10 10s. per ton.

Among potash products caustic meets with a fair amount of inquiry at £28 10s. per ton for 90 per cent. material. Carbonate of potash is rather quiet at about £22 10s. per ton. Yellow prussiate of potash meets with a very limited inquiry and values show a weak tendency, the current basis being from 6¾d. to 7d. per lb. Permanganate of potash is still quiet and easy at from 6¼d. to 7d. per lb. according to quality. Chlorate of potash is steady and in moderate demand at 2¾d. per lb. Bichromate of potash is unchanged at 5½d. per lb.

Arsenic is still a very sluggish section of the market and export trade in this material shows little sign of picking up; values are easier, white powdered, Cornish makes, now being quoted at about £16 per ton, Manchester. Sulphate of copper is a comparatively quiet market, with prices fairly steady at £24 10s. to £25 per ton, f.o.b. Commercial Epsom salts are in moderate request at £4 15s. per ton, with magnesium sulphate, B.P., quoted at £6 10s. per ton. Acetate of lead is steady and in fair demand at £45 per ton for white and £42 10s. for brown. Acetate of lime is attracting some attention; grey is offering at £15 to £15 10s. per ton, and brown quality at about £11 10s. Nitrate of lead is rather quiet at £42 per ton.

Acids and Coal Tar Products

Little interest is being shown in either tartaric or citric acid; values have an easy tendency, although they are quotably unchanged from last week at 1s. and 1s. 4d. per lb. respectively. Oxalic acid is quiet at round 4d. per lb. Acetic acid is steady and in fair demand at £43 per ton for 80 per cent. commercial and £68 per ton for glacial.

The coal-tar products section generally is featureless. Pitch is quiet and easy at about £2 5s. per ton. Solvent naphtha is rather steadier at 1s. 2d. per gallon, but the demand is on quiet lines. Carbolic acid still fails to attract attention; crystals are quoted at 6d. to 6½d. per lb. and crude at 1s. 10d. per gallon. Naphthalenes are in small demand, with values fairly steady at £16 per ton for refined and £5 and upwards for crude. Creosote oil is quiet at 5¾d. per gallon. Cresylic acid is maintained at 2s. 2d. per gallon.

American Coal-tar Imports Assessment

IN deciding a protest against the official assessment on imported coal tar dyes on the basis of the American selling price of domestic products and as competitive, the American Board of General Appraisers said: "The merchandise consists of coal-tar dyes known as 'Alizarine Blue Black Powder, Alizarine Blue Black B Powder, Alizarine Blue Black BBB Powder,' and 'Patent Blue V.' The single query is: Are these dyes similar to or competitive with domestic dyes? We believe the question must be answered in the affirmative in view of the evidence in the case and because of the following definite language in Paragraph 28 of the Tariff Act of 1922: 'For the purpose of this paragraph any coal-tar product provided for in this act shall be considered similar to or competitive with any imported coal tar product which accomplishes results substantially equal to those accomplished by the domestic product when used in substantially the same manner.'"

Reduced Electric Furnace Prices

AN electric furnace has now become a necessary piece of equipment for all well-regulated laboratories wherever any carefully controlled heating is carried out. For such purposes as determining the carbon content in steel, for tempering, annealing, or hardening steel it has many advantages over a gas-fired instrument, mainly in cleanliness and the ease of maintaining an even temperature. The cost of running an electric resistance furnace on a power circuit is also quite comparable with the cost of running a gas-fired example. As to first cost, the electric furnace tends unavoidably to be the higher, but it is satisfactory to note that A. Gallenkamp and Co., Ltd., have announced a reduction in the prices of all their models, and have taken the opportunity to re-issue their catalogue. The catalogue, which will be sent to readers on application to 19/21, Sun Street, Finsbury Square, E.C.2, contains full particulars of muffle, tube, crucible, tubular and other furnaces and accessories, such as pyrometers and control panels.

Rapid Measurement of Electrical Resistance

A NEW catalogue describing the use of "Ducter" low-resistance testing sets has just been brought out by Evershed and Vignoles, Ltd., of Acton Lane Works, Chiswick, London, W.4. The "Megger" and "Bridge-Megger" resistance-testing sets made by the same firm are well known devices for rapidly determining electrical resistances from several thousand megohms down to one ohm. The "Ducter" can equally rapidly determine low resistances down to one michrohm. The current for the instrument, it may be noted, is obtained from cells of the alkaline type, which are able to stand up to high rates of discharge, which would soon ruin ordinary sulphuric acid cells. The catalogue contains a simplified theoretical description of the apparatus and a comprehensive survey of its practical applications.

Large Scale Petroleum Research

LABORATORY investigations of crude petroleum often do not agree with subsequent operations on a commercial scale, and recognising this the U.S. Bureau of Mines has built an experimental plant on a semi-manufacturing scale for the purposes of investigations bearing on the refining of crude petroleum. The plant has a capacity for 10 gallons of crude oil, and is fitted with the usual features, fractioning tower, air and water-cooled condensers, etc. Distillation of one or two crude oils under different conditions have so far been carried out, and particulars of the results, together with full descriptions of the plant and method of working, have been published by the Department of the Interior Bureau of Mines in Serial 2632, obtainable from Washington, D.C., U.S.A.

Company News

ALIANZA CO., LTD.—An interim dividend of 20 per cent. on account of the profits for the current year has been declared.

ROPP TIN CO.—An interim dividend of 20 per cent., less tax, is announced, payable on October 29. A year ago a dividend of 15 per cent. was paid.

LAUTARO NITRATE CO., LTD.—The directors announce a third interim dividend on account of the year 1924 of 5 per cent., or 5s. per share, payable on October 24.

BORAX CONSOLIDATED, LTD.—The directors have declared a dividend at the rate of 6 per cent. per annum, less tax, on the preferred ordinary shares in respect of the half-year ended September 30, payable on November 1.

BRYANT AND MAY, LTD.—The directors announce an interim dividend of 4 per cent., free of tax, on the ordinary and partnership shares for the half year ended September 30 (the same as a year ago), payable on November 1.

ALUMINIUM CORPORATION, LTD.—The profit for the year 1923, after allowing for debenture interest, is £13,433, making with £6,096 brought in, the balance at credit of profit and loss account £19,529. The directors recommend a dividend of 7 per cent., less tax, on the preference stock and shares, leaving £6,323 to be carried forward.

BRITISH CYANIDES, LTD.—The report of the directors for the year ended April 30 states that the transactions show a loss of £24,991, which compares with a profit of £17,205 in the preceding year. A credit balance of £14,847 was brought forward, from which is deducted £1,425 for the interim preference dividend paid on December 15 last, leaving £13,423 to be set against the past year's loss. There is thus a debit balance of £11,568 to be carried forward. A sum of £43,696 has been charged against reserve (reducing that account to £6,304), being the cost of the shares in the British Potash Co., in liquidation, which are now of no value. The balance-sheet shows investments (at cost) in and sums due from allied companies at £90,397. The position and prospects of the company have, it is stated, improved during the past few months.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

PITCH AND CREOSOTE OIL.—Tenders are invited for the supply and delivery in quantities as required, during the period ending March 31, 1925, of 1,500 tons pitch to Corporation specification "A," and 90,000 gallons creosote oil to Corporation specification "B," for Liverpool Corporation. Forms of tender forwarded on application to City Engineer, Municipal Buildings, Dale Street, Liverpool. Tenders by October 14.

PAINT.—Tenders are invited for the supply of 45 metric tons of paint for Cairo bridges. Tenders to be presented in Egypt by November 10. (Reference No. B.X./1271.)

CHALMOUGRA OIL AND PHARMACEUTICAL PRODUCTS.—A firm in San Juan wishes to communicate with British manufacturers of pharmaceutical products with a view to purchasing supplies of these goods, particularly chalmougra oil. (Reference No. 399.)

Zinc Production in Canada

ACCORDING to official statistics during 1923, Canada produced 60,416,240 lb. of zinc, valued at $3,991,701, compared with 56,290,000 lb., valued at $3,217,536 in 1922. The total increase is thus 7 per cent. in quantity and 24 per cent. in value.

According to a preliminary report, during the first half of 1924, the production of zinc in Canada amounted to 29,444,000 lb., all of which was refined at the Trail (B.C.) smelter. This output at the St. Louis price of 6.229 cents per lb., was valued at $1,832,198. The output was slightly less in quantity than the amount reported for the first half of last year, when 29,950,000 lb. of zinc was produced, valued at $2,072,839. There was no production of zinc ores in the Province of Quebec during the first six months of this year.

Tariff Changes

AUSTRALIA.—A notice revokes, as from November 10, 1923, the dumping duty applied in Australia under Section 5 of the Customs Tariff (Industries Preservation) Act to hyposulphite of soda originated in or exported from the United Kingdom.

NETHERLANDS.—The Board of Trade publishes full details of proposed extensive changes and amendments, including alterations dealing with alcohol and products, acetic and nitrous ether and products, oils and fats, petroleum, etc.

PALESTINE.—Extensive alterations are recorded. A duty of P.T. 1 per kilog. on table salt is announced. Other specific duties include:—Petroleum products—kerosene and refined petroleum for burning, per gall., P.T. 0·6; motor spirits, per gall., P.T.4; residues, including mazut, Diesel oil, solar and crude oil, per ton, P.T. 60; caustic soda, per 100 kilogs., P.T. 20.

Union of South Africa Amended Tariff

RECENT amendments in the Customs Tariff include the imposition of a duty of 2s. per 100 lb. on sodium carbonate imported from all countries. (This article was formerly duty free when imported from the United Kingdom.) The following items have been added to the list of goods which are duty free when imported from the United Kingdom and reciprocating British Possessions, and which are dutiable at the rate of 3 per cent. *ad valorem* when imported from other countries:—Ferro-chrome and ferro-manganese, in bulk; ferrous and zinc sulphates; linseed, castor and whale oil, fatty acids; turpentine, cresylic acid, green oil, iodine and potassium iodide; in bulk, for the manufacture of dips, dipping powders and other substances for the destruction of agricultural pests; under such conditions and regulations as the Commissioner of Customs may prescribe. Leads, white and red, ground in oil, in bulk, to be used in the manufacture of paints for resale; under such conditions and regulations as the Commissioner of Customs may prescribe. Magnesium carbonate for use in the manufacture of explosives; in bulk. Glass tubes, composition pitch, ceresine wax and excelsior salts, for the manufacture of dry batteries; under such conditions and regulations as the Commissioner of Customs may prescribe.

The following have been added to the list of those goods which are duty free from all countries:—

Cinematograph films, scientific and technical, for exhibition solely to scientific or technical associations. Laboratory glass ware and porcelain ware, and scientific apparatus and instruments for scientific observation or record or for the control of manufacturing operations; insulin.

An Engineers' Club in Birmingham

THE proposal for the formation of an Engineers' Club in Birmingham has now taken definite shape, and a very conveniently situated building has been acquired opposite the south entrance to New Street Station. Membership of the Club is open to all professional men in touch with the engineering industry in all its branches, including chemists and metallurgists. It is hoped that local engineering concerns will subscribe to the raising of the £6,000 capital as was the case in the formation of the London and Manchester Engineers' Clubs. The subscription is to be four guineas per annum for town members and two guineas for country members. There will be no entrance fee for members joining before the end of this year. The premises are very convenient for club purposes, and the usual restaurant, billiard room, bedroom and other facilities associated with well-appointed clubs will be provided. There will also be a number of rooms suitable for meeting of societies and committees. It is expected to open the club in January. The honorary secretary is Mr. A. R. Page, The Laboratory, Birmingham Small Arms Co., Ltd., Birmingham.

New L.M.S. Posters

THREE more posters of the "R.A. Series" have been produced by the London Midland and Scottish Railway, and will be exhibited at the principal stations on the system during the present week. These are "Warwick Castle," by Mr. Adrian Stokes, R.A., "Conway" by Sir David Murray, R.A., and "Coal" by Mr. G. Clauson, R.A.—a further addition to the posters representing British industries.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that occur.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

KENNEDY, A., AND SON, 150, Kingsland Road, N., manufacturing chemists. (C.C., 11/10/24.) £19 17s. 6d. June 10.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]*

LAMBERT (SAMUEL) AND CO., LTD., London, E.C., drug merchants. (M., 11/10/24.) Registered Spetember 24, £400 debentures; general charge. *Nil. January 14, 1924.

SEMPROLIN CO., LTD., London, E.C., chemists. (M., 11/10/24.) Registered September 23, £6,000 debentures, to A. Belton, 18, Leather Lane, E.C., director of a company; charged on lease of 18, Leather Lane, E.C., also general charge. *Nil. January 10, 1924.

TORBAY AND DART PAINT CO., LTD., London, E.C. (M., 11/10/24.) Registered September 24, £100 debentures, part of £1,250; general charge. *£8,750. November 14, 1923.

Satisfaction

LONSDALE BROS., LTD., Blackburn, manufacturers of boiler composition. (M.S., 11/10/24.) Satisfaction registered September 29, £500, balance of amount registered October 18, 1905.

Receiverships

BRITISH SCIENTIFIC INDUSTRIES, LTD. A. Dobson, of Post Office House, Infirmary Street, Leeds, ceased to act as receiver on September 30, 1924.

LONDON HYGIENIC CHEMICAL CO. (1922), LTD. E. C. Gardner, of 6, Cumnor Road, Sutton, ceased to act as receiver or manager on September 30, 1924.

BENNISONS, LTD. P. S. Booth, of Kimberley House, Holborn Viaduct, E.C., ceased to act as receiver on September 24, 1924.

SOMERVILLE (W. A.), LTD. (R., 11/10/24.) J. Airey, of 8, Victoria Street, Liverpool, was appointed receiver and manager on September 18, 1924, under powers contained in first mortgage debenture dated March 9, 1922.

London Gazette, &c.

Company Winding Up

C.V.O. CHEMICAL WORKS (1919), LTD., 29, Friar Lane, Leicester. (C.W.U., 11/10/24.) Meetings, creditors, October 14, 11.30 a.m., and contributories, October 14, noon, 33, Carey Street, Lincoln's Inn, London, W.C.2.

Companies Winding Up Voluntarily

CARBONEX, LTD. (C.W.U.V., 11/10/24.) F. L. Goldby appointed liquidator September 16.

LALO OIL PRODUCTS CO., LTD. (C.W.U.V., 11/10/24.) E. R. Metcalfe, of 78a, Mosley Street, Manchester, appointed liquidator, August 22. Meeting of creditors at the offices of Burton and Disley, Chartered Accountants, 29, Brown Street, Manchester, on Tuesday, October 14, at 11 a.m.

Bankruptcy Information

HOWARTH William, Bradley Fold, near Bolton, soap manufacturer. (R.O., 11/10/24.) Receiving order, September 29. Debtor's petition.

Notice of Dividend

CARRERAS, Alfonso, 4, Marble Arch, London, W., and CARRERAS, Enrique, the Regent Palace Hotel, London, W.1, trading and described in the Receiving Order as A. AND E. CARRERAS (a firm), of and lately carrying on business at 207, King Street, W.6, in the county of London. Second and final dividend, 2¾d. per £, payable October 14, at offices of the Trustee, David Hart, F.L.A.A., 23-25, Maddox Street, London, W.1.

New Companies Registered

AMALGAMATED LABORATORIES, LTD. Manufacturers of and dealers in all kinds of medical, surgical and chemical preparations, apparatus and appliances, etc. Nominal capital, £225 in £1 shares. Solicitors: Kenneth Brown, Baker, Baker, Lennox House, Norfolk Street, Strand, London.

HARRINGTON FIRE APPLIANCES CO., LTD. Sellers of fire extinguishers, etc. Nominal capital, £6,000 in £1 shares. Secretary: 1 and 2, Queen Street, Cheapside, E.C.4.

HASLAM FIRE EXTINGUISHER CO., LTD. Manufacturers of fire extinguishers. Nominal capital, £10,000 in £1 shares. Solicitor: R. Bolton, 25, Wood Street, Bolton.

GOREHILL PRODUCE, LTD. Oil producers and refiners, manufacturers of chemicals, artificial manures, cement and road making materials, tar distillers, etc. Nominal capital, £5,000 in 3,000 "A" shares and 2,000 "B" shares of £1 each. Solicitor: H. R. Buchanan, 172, St. Vincent Street, Glasgow.

McDOWALL MORRISON AND CO. (MANCHESTER), LTD., Hadfield Street, Cornbrook, Manchester. Analytical and consulting chemists and druggists, manufacturers, importers, exporters and wholesale and retail merchants, etc. Nominal capital, £5,000 in 100 6 per cent. cumulative preference shares of £10 and 4,000 ordinary shares of £1.

PRICE'S (RHODESIA), LTD., 22, Great St. Helens, London, E.C.3. To make, sell, deal in and distribute candles, nightlights, oils, greases, glycerine, edible greases, fats, stearine, oleine, etc. Nominal capital, £10,000 in £1 shares.

WEMBLEY EXHIBITORS' DISPOSAL SYNDICATE, LTD., 16, Maddox Street, London, W.1. To acquire from the the exhibitors at the British Empire Exhibition, 1924, at Wembley, the right or concession to dispose of their surplus goods on commission or otherwise, and, on the acquisition of the said goods or right to dispose of the same, to dispose thereof either by public auction or private treaty or by opening shops, depôts, or stalls for the disposal of the same, etc. Nominal capital £1,000 in 994 ordinary and six founders' shares of £1 each.

"Catechin Chemistry"

THE opening meeting of the 1924-5 Session of the Bristol branch of the Society of Chemical Industry was held in the University chemical department on October 6. It had been arranged to hold the meetings jointly with the Bristol and South-Western Counties Section of the Institute of Chemistry.

Dr. M. Nierenstein read a paper on the "Present Position of the Catechin Chemistry." Catechin is an astringent principle found in cutch, a substance used in the East for dyeing and tanning, and occasionally in medicine. Black cutch, in the form of an extract, is produced from the wood of Indian acacia trees, while pale cutch is manufactured in Singapore from the leaves and twigs of a shrub. The lecturer described the preparation of various forms of crystalline catechin and demonstrated the constitution of those that had been investigated. The research work had been carried out in the bio-chemical laboratory of the Univeristy.

Dr. Mann, Director of Agriculture to the Government of Bombay, speaking of the uses of cutch in India, described the preparation and consumption of cutch, mixed with pan leaves and betel nut, as a masticatory held in universal esteem by the natives as a stimulant and aid to digestion.